SIEMENS

MAMMOMAT 1000/3000

SP

Installation

Installation and Start-Up Instructions

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General

The configuration of the Mammomat installation is dependent on the customer's choice. Up to twelve various combinations are possible as shown below:

MAMMOMAT 1000

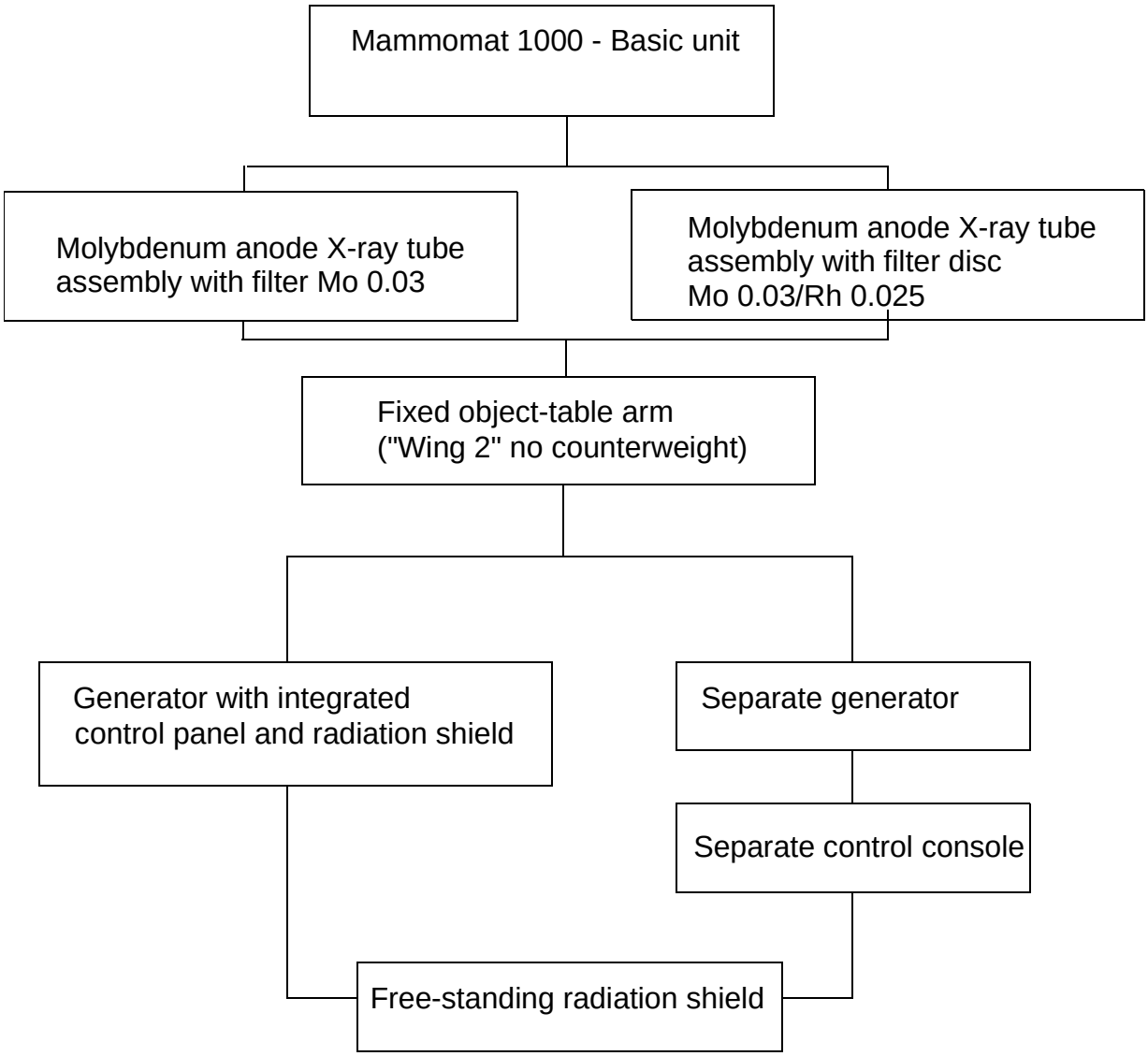
Mammomat 1000 - Basic unit
Molybdenum anode X-ray tube assembly with filter Mo 0.03
Molybdenum anode X-ray tube assembly with filter disc Mo 0.03/Rh 0.025
Fixed object-table arm ("Wing 2" no counterweight)
Generator with integrated control panel and radiation shield
Separate generator
Separate control console
Free-standing radiation shield

Fig. 1

MAMMOMAT 3000

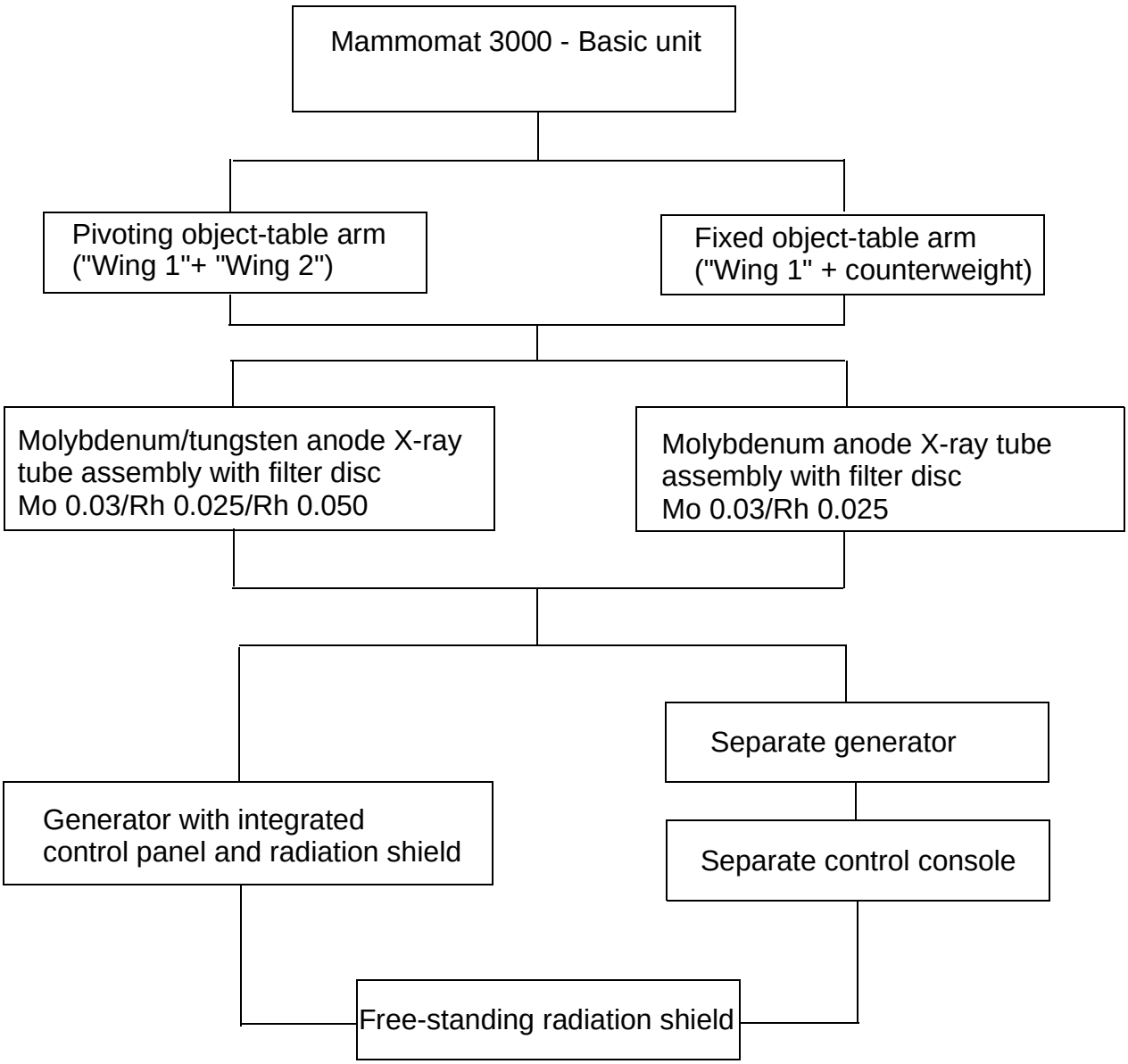
Mammomat 3000 - Basic unit
Pivoting object-table arm ("Wing 1"+ "Wing 2")
Fixed object-table arm ("Wing 1" + counterweight)
Molybdenum/tungsten anode X-ray tube assembly with filter disc Mo 0.03/Rh 0.025/Rh 0.050
Molybdenum anode X-ray tube assembly with filter disc Mo 0.03/Rh 0.025
Separate generator
Generator with integrated control panel and radiation shield
Separate control console
Free-standing radiation shield

Fig. 2

NOTICE

A P40 MoW tube will be delivered irrespective of whether the customer has chosen the molybdenum/tungsten anode X-ray tube or the molybdenum anode X-ray tube. In the last case, the tungsten anode is deselected by the software.

Unless otherwise stated, these instructions describe the stand with pivoted object-table arm and generator with integrated radiation shield and control panel.
Depending on the installation configuration, some points may be omitted.

Meters and appliances, tools

Meters and appliances required

NOTICE **Calibrated instruments are required.**

- Power Line Impedance Meter 84 28 104 RE999.
- Protective ground-wire tester 44 15 899 RV090.
- Oscilloscope, e.g TEKTRONIX 314.
- Digital multimeter incl. mAs meter.
- Densitometer e.g PDA 81.
- Service PC (e.g Siemens-Nixdorf PCD 3NSX/20 or similar) with connecting cable (PC-Generator), part no. 99 00 440 RE999.
- Normi 7 test body (provided by the customer) or SIB phantom Type 42 001 (PTW or INAK).
- Centering cross, part no. 96 60 051 RE 999.
- Plexiglass plates, three plates measuring150 mm x 20 mm x 20 mm and one plate measuring 150 mm x 150 mm x 10 mm, part no. 85 49 438 and 97 88 423 respectively.

⚠WARNING **For safety reasons, the existing protective ground conductor in the power cord must under no circumstances be disconnected when operating the oscilloscope. For those measurements, in which any resulting ground loop may falsify the measuring result, use the differential amplifier (difference measurement)**.

Tools required

- Standard installation tool kit.
- Torque wrench for bolting the stand/generator to the floor (optional).
- Electrical screwdriver with adjustable torque is recommended.

NOTICE **Checks and/or adjustments, which must be made with X-ray radiation switched on, are marked with the warning symbol:**

Important notes on start-up

The **MAMMOMAT** is adjusted, programmed and tested in the factory, leaving only the adaption to the on-site mains voltage and the functional tests to be performed.

When the measurements to be made (kV, mAs, etc.) are within the tolerances stated in these instructions, this confirms that the settings made in the factory have not changed and the equipment is fully serviceable.

The measured values marked with ✍ in Chapter 10 "Checks with high voltage" shall be entered in the "start-up" column in the test certificate provided.

The service PC is required only for programming according to:

- **Chapter 10 "Checks with high voltage**"
- **Chapter 11 "Start-up and functional test of the IONTOMAT**"

  Programming the "Correction curve"

  Setting the "sensitivity" (film density)

  Setting the "sensitivity correction" (adaption to different exposure techniques)
- **Chapter 12 "Further programming**"
- **Chapter 18 "Final procedures**"

Description of the Service-PC syntax is found in Chapter 20 "Appendix".

NOTICE **If the generator is switched off with the Service PC connected, wait approximately 5 s before switching it on again.**

Checking and recording for the area of application of the X-ray decree (§16 Germany)

In the area of application of the X-ray decree, an acceptance test certificate is supplied, with most of the data filled in by the factory.

Only:

- the cut-off dose
- the resolution of the film/screen systems used
- the output values of the constancy test

must be determined by the owner of the equipment and recorded in the acceptance test certificate. Furthermore, the front page of the acceptance test certificate must also be completed with the operator´s data.

Checking and recording for the DHHS area of application

In the area of application of the DHHS regulations, maintenance measurements must be made according to the "DHHS Maintenance Instructions" SPB7-230.662.03.01.02 and the "DHHS Supplements to the instructions for use" SPB7-230.661.02.01.02.

Sections

- Required labels.
- Radiation ON indicators.
- Manual termination of exposure.
- Checking the maximum adjustable mAs.
- Filters in beam limiting device (BLD).
- Reproducibility.
- kVp-accuracy.
- mAs-accuracy.
- Automatic exposure control (AEC).
- Coincidence of radiation field/image receptor.
- Alignment of light field/X-ray field.
- Illuminance of light localizer (light field).
- Shut-down of motor-driven compression movement.

The result must be recorded in "DHHS Measurement certificates"

SPB7-230.663.03.01.02.

Some of the values to be determined can be taken from the acceptance test certificate.

The radiation-field limitation is set at the factory and recorded in the acceptance test certificate.

If the measurements to be made concerning the radiation-field limitation are within the tolerances stated in these instructions, this confirms that the settings made at the factory have not changed.

Note on delivery state

The **MAMMOMAT** has been tested and adjusted at the factory, and should therefore be ready for operation after completion of the installation.

The equipment is set to 400 V, 2-pase, on delivery.

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Protective measures

It is very important that any intervention in the equipment will start with disconnecting it from the power supply with the main circuit-breaker. Before removing or inserting any of the printed circuit board, switch of the equipment. To prevent accidental triggering of high voltage and radiation, set the switch S2 (SS) on p.c. board D702 to "OFF" (lower position, no triggering of the SS relay).

⚠WARNING

If the system is only switched off at the control panel or with S2/D711, line voltage will still be present at the generator line connection, line filter Z1, Z2, transformer T1, transformer T10 and p.c. board D711 (see wiring diagram).

⚠WARNING

After shut-down of the system, there may still be 380 V DC present on the intermediate circuit. This will be indicated by LED V24 on p.c. board D710. The voltage will drop to less than 30 V within about 3 minutes, the LED goes out at about 30 V.

CAUTION

The p.c. boards contain electrostatic highly sensitive components requiring particular care in their handling (ground before making contact and place only on a conductive surface).

⚠WARNING

The edges of the metal curtain of the stand are very sharp and may cause severe injury. Apply the protective strips as mentioned in section Protective Measures after removing the covers from the the stand. Remove the protective strips only when the covers are to be mounted or when vertical adjustment of the swivel-arm system is necessary.

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General

Scope of delivery

The **MAMMOMAT** is normally packed in one crate and one cardboard box (the number of packages is dependent on the customer's choice, however):

Crate (length 2140 mm, width 800 mm, height 1375 mm)

The crate contains:

- Compression plate
- Stand with X-ray tube assembly and base plate
- Object table 18 cm x 24 cm (Bucky)
- External diaphragm
- Cover panels
- Installation material
- Optional: Stanchions for the lead-glass pane (radiation shield)
- Cable ducts
- Technical documents

Cardboard box (lenght 1210 mm, width 820 mm, height 700 mm)

The cardboard box contains:

- Generator with integrated control panel, high-voltage generator and base plate.
- Optional: Lead-glass pane
- Optional: Separate control console

Further accessories are packed in a separate cardboard box.

Unpacking

As a general rule, the directional marks on the crates should be observed during transport, storage and unpacking.

The stand crate is bolted together, while the cardboard box is secured with plastic straps.

⚠WARNING	**Wear safety footwear!**

Unpacking the stand

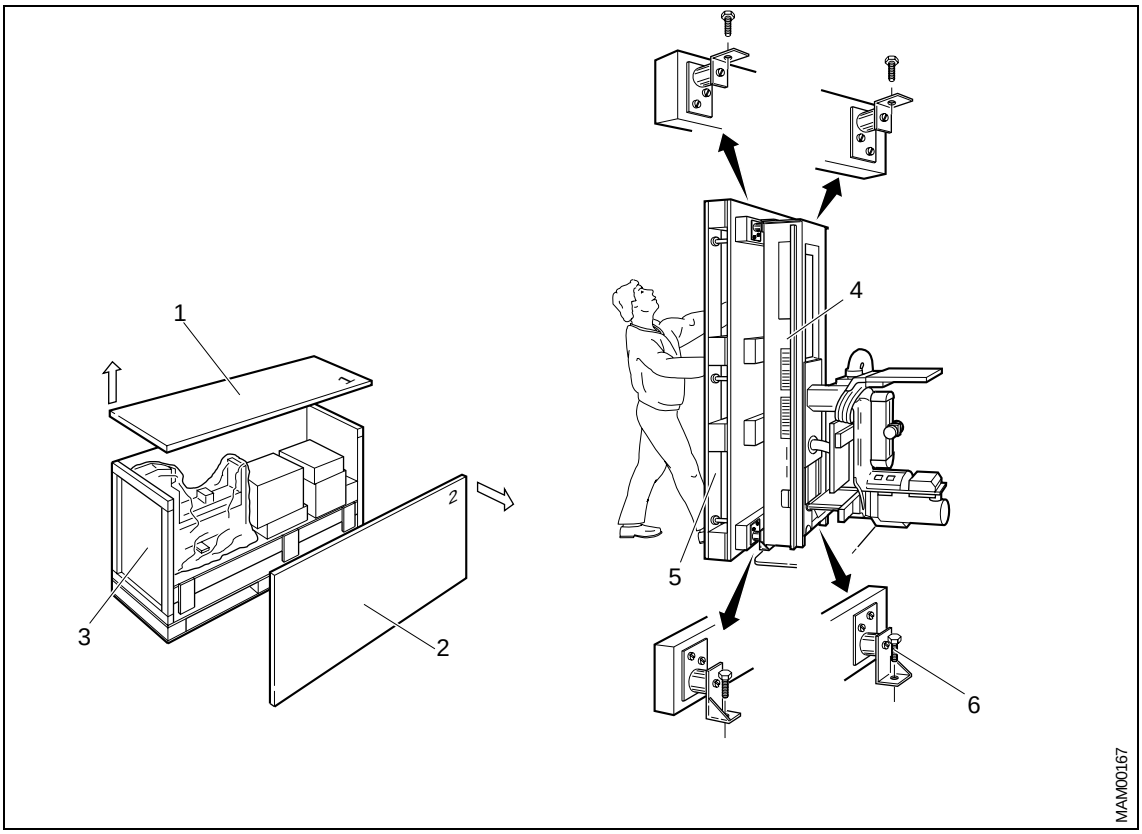

Fig. 1 Unpacking the stand

Unpacking

1. Open the stand crate by removing the top (1) and then the side wall (2).
2. Take out all enclosed packages (accessories, installation material, cover panels etc.) from the crate.
3. Remove the wooden supports.
4. Remove the remaining walls (3).
5. Move the stand and pallet to the site of erection.
6. Upend the stand (4), with pallet (5) (two persons are required).
7. Loosen the four bolts (6) and remove the pallet (5).

Removing the transport safeguards

Removing the swivel-arm system transport safeguard

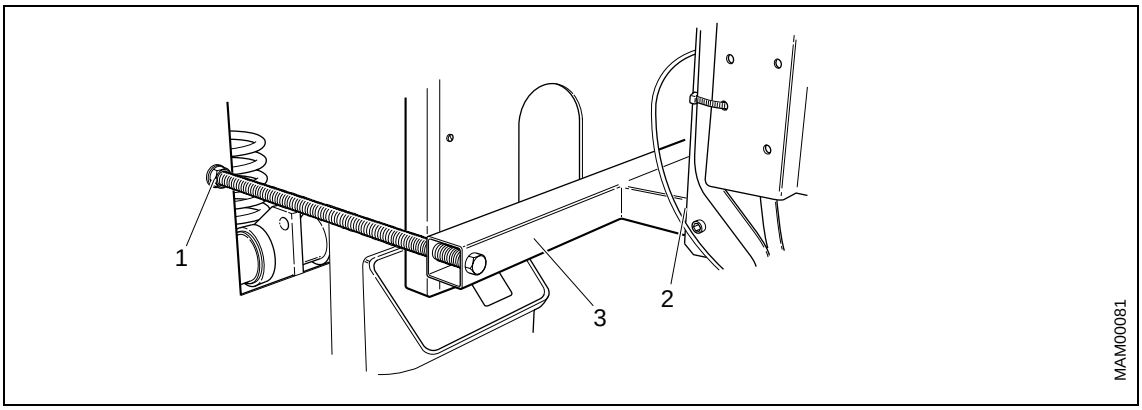

Fig. 2 Swivel-arm system transport safeguard

1. Loosen the transport safeguard nuts (1/Fig. 2) and remove the tube head screws (2/Fig. 2).
2. Push the red transport safeguard (3/Fig. 2) inwards, away from the tube head.

NOTICE

Removal of the swivel-arm system transport safeguard is done after the equipment has been powered up, see further section "Attaching the swivel-arm covers" on page 7 - 1.

Transport safeguard for the lifting carriage

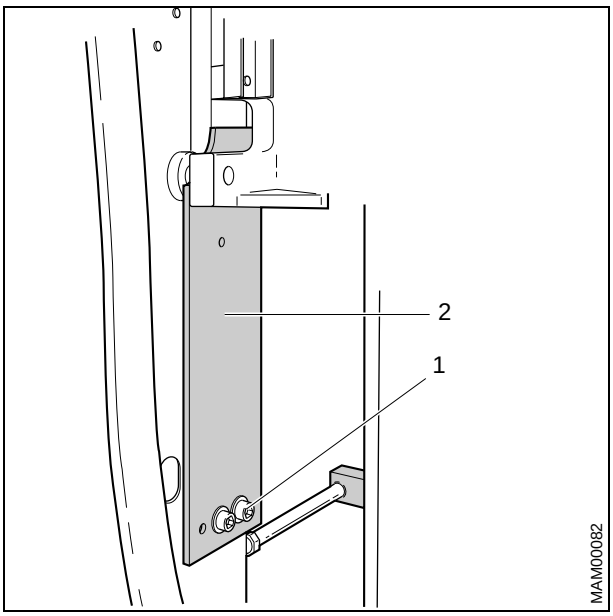

Fig. 3 Transport safeguard for the lifting carriage

1. Loosen the two screws (1/Fig. 3) and remove the red transport safeguard (2/Fig. 3). Reinsert screws (1/Fig. 3), they might be needed for service purposes.

NOTICE **The lifting carriage transport safeguard shall be kept for service purposes (Fig. 5).**

2. Cut and remove the cable tie securing the balancing spring during transport.

Transport safeguard for the rotary motion

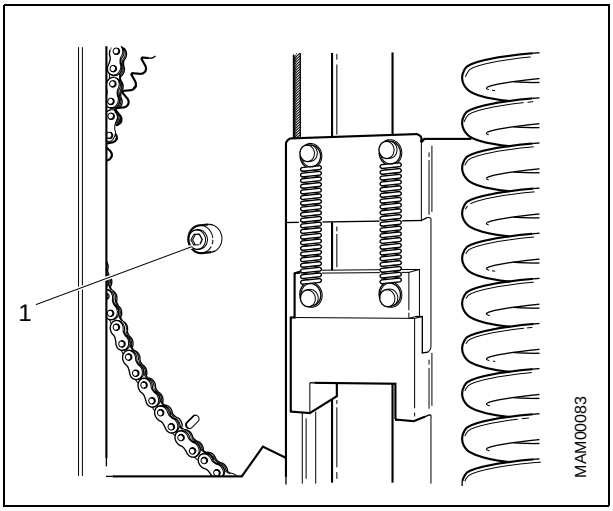

Fig. 4 Transport safeguard for the rotary motion

1. Remove the transport safeguard screw (1/Fig. 4) with spacer to enable rotary motion.
   The screw and the spacer should be kept for the mounting of the lifting carriage transport safeguard.
2. Mount the red lifting carriage transport safeguard with screw and spacer (1/Fig. 4) on the left hand side of the stand, see Fig. 5. Insert the screw through the slot from the inside of the stand, see Fig. 6

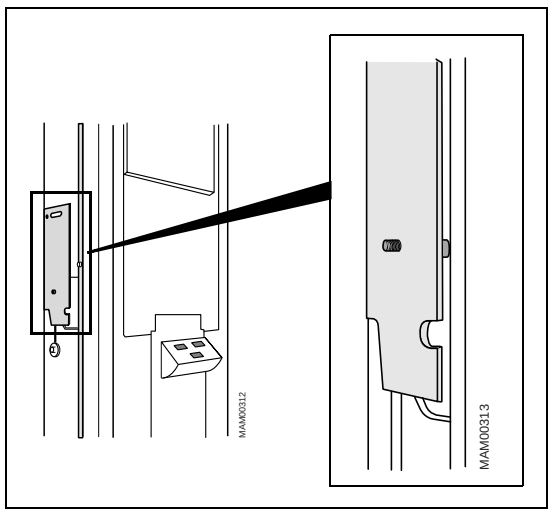

Fig. 5 Transport safeguard mounted on the stand

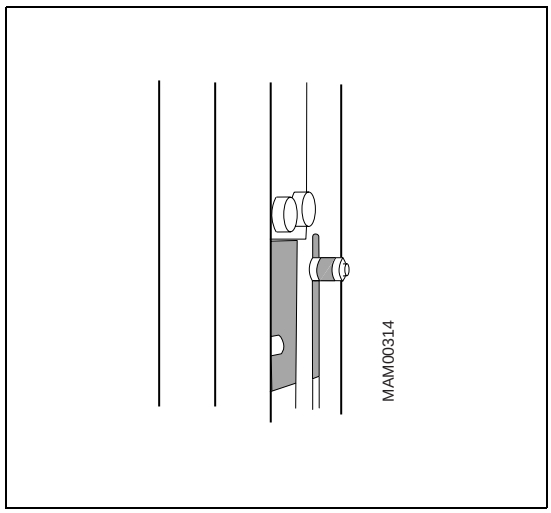

Fig. 6 Screw and spacer inserted from the inside of the stand

3. Tighten the screw. Make sure that the transport safeguard is parallell to the stand.

Protective strips for the metal curtain

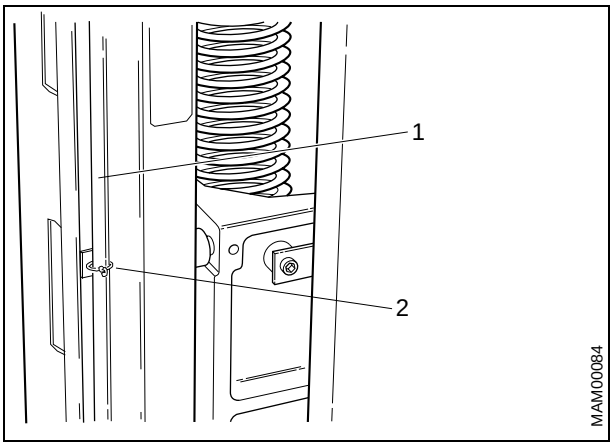

Fig. 7 Protective strips for the metal curtain

The edges of the metal curtain are very sharp and are therefore provided with protective strips (1) on delivery. These strips must always be applied onto the edges of the metal curtain during service and maintenance work.

CAUTION **The protective strips must be removed from the metal curtain before any vertical adjustment of the swivel-arm system is performed.**

Holders (2) for storing the protective strips when not in use, are provided on both sides of the curtain, see Fig. 7.

Unpacking the generator and mounting the radiation shield (optional)

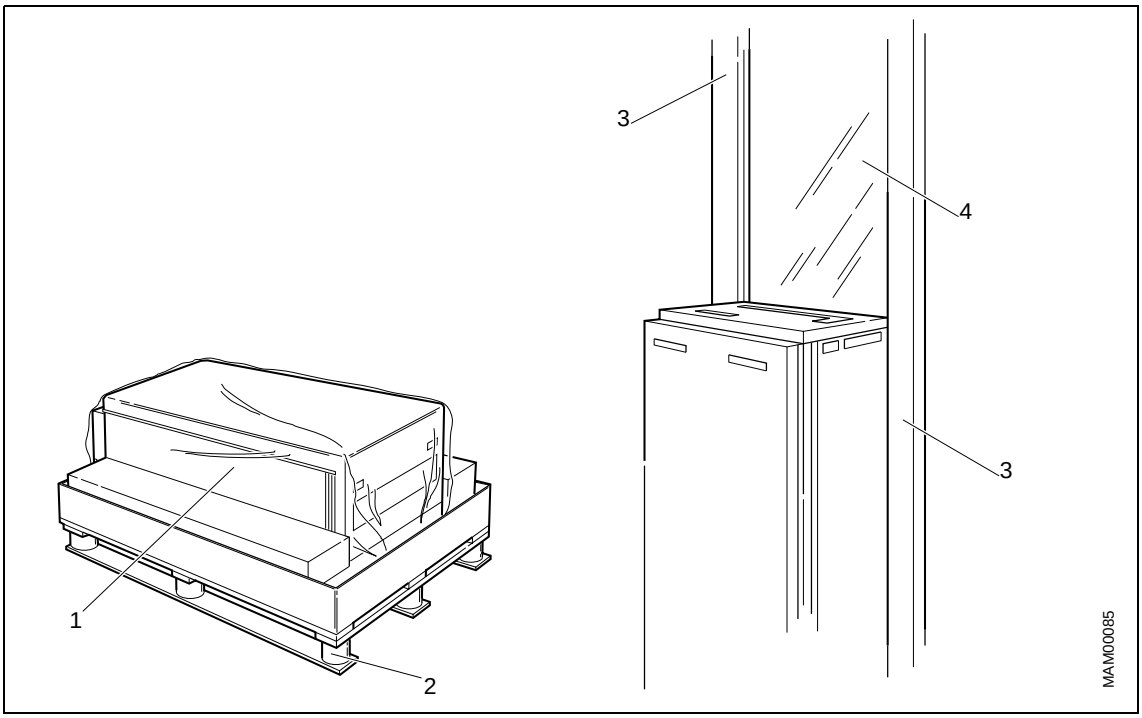

Fig. 8 Unpacking the generator

1. Open the cardboard box by cutting the plastic straps.
2. Lift out the lead-glass and put it away in a safe place.
3. Remove the protective cover from the generator.
4. Upend the generator (1/Fig. 8) and lift it off the pallet (2/Fig. 8) (two persons are required).

➪ Optional:

5. Insert sheet-metal strip (5/Fig. 9) (additional radiation protection) into both stanchions.
6. Fit the lead-glass (4/Fig. 9) into both vibration absorbing strip (6/Fig. 9) and fix it softly by screws (1/Fig. 10).

NOTICE **The screws must be mounted before the lead-glass is inserted in the stanchions.**

7. Fit the lead-glass (2/Fig. 10) into the groove of one of the stanchions (3 /Fig. 10) and keep it in position while mounting the other stanchion (3 /Fig. 10).
8. Mount the stanchions and lead-glass unit with 6 screws onto the generator (3, 4 / Fig. 8) (two persons are required).
9. Cover the holes with plastic caps (7/Fig. 9).

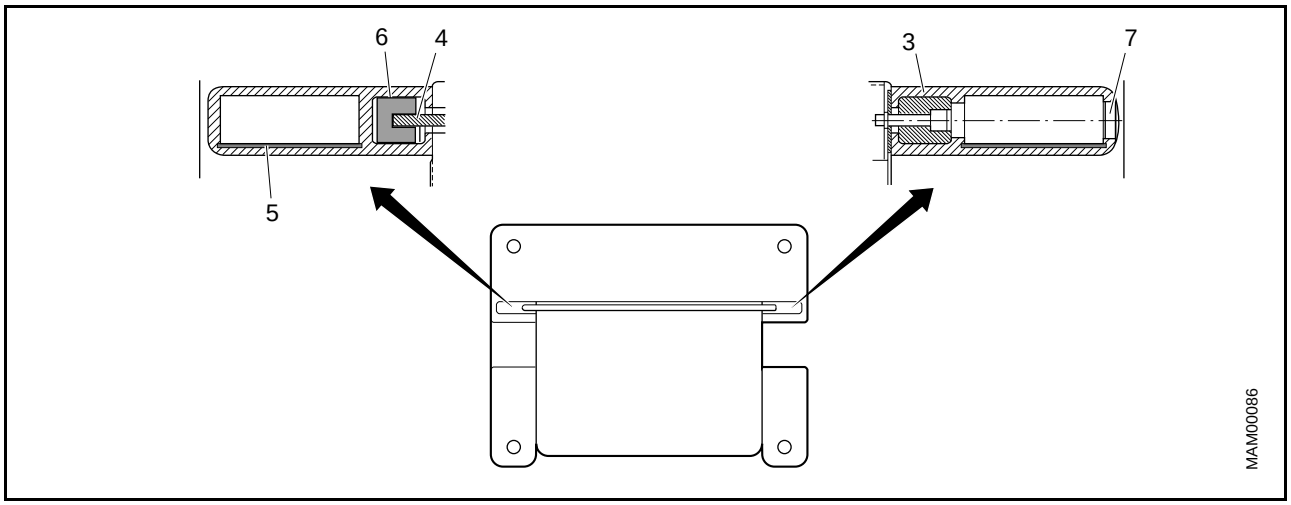

Fig. 9 Mounting the radiation shield

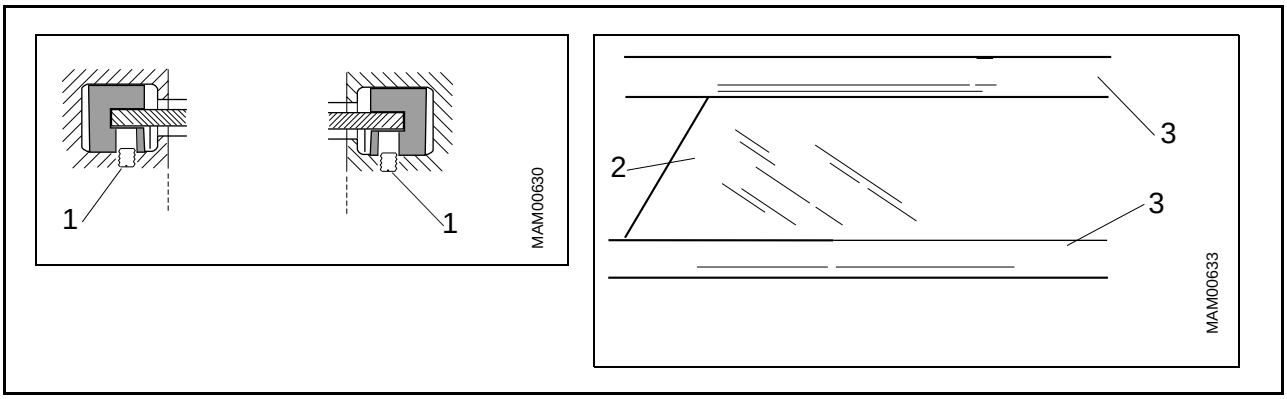

Fig. 10

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Arranging the components

Position the stand and the generator in accordance with installation plan and Fig. 1 below.

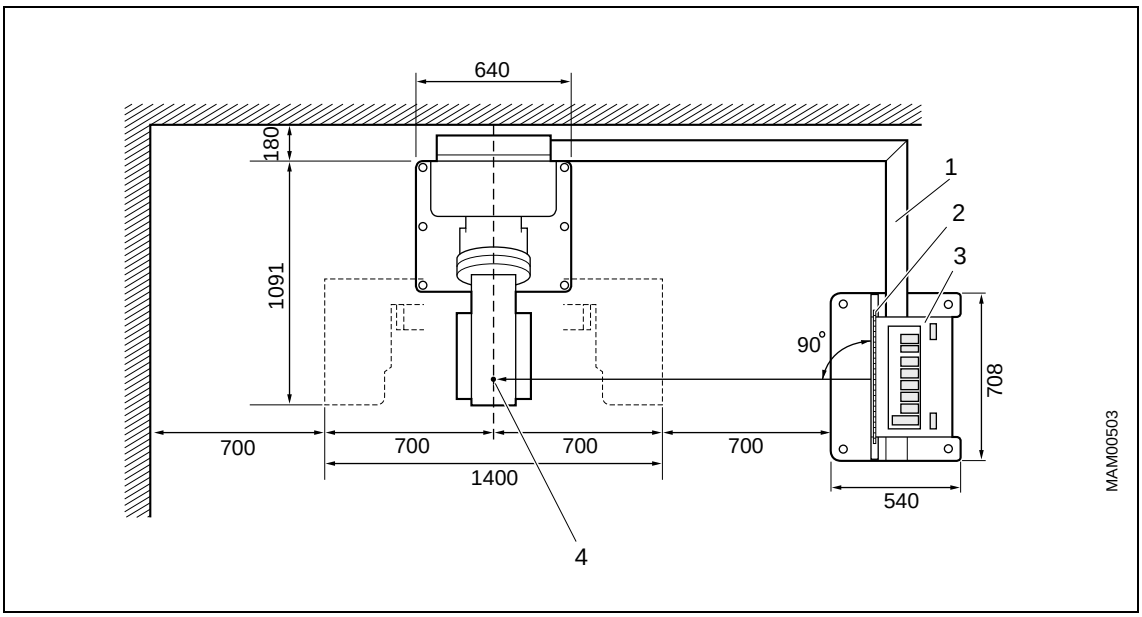

Fig. 1 Installation, top view

Cable duct (1) and generator (3) with radiation shield (2) can be installed optionally to the left or to the right of the the stand. The cables can also be laid underfloor. Maximum cable length between stand and generator is approximately 3.5 m.

Radiation shield (2) at right angles to the swivel-arm system and centered to the focus mark (4) on the tube-head cover according to Fig. 1.

Recommended minimum distance to wall and generator base plate respectively is 700 mm (shorter distances may be used at the customer´s desire, if in compliance with local regulations).

For the installation of the cable duct, a minimum distance of 180 mm between wall and stands is required.

Notes on installations with separate generator and separate control console

- The separate generator can be installed in any suitable place. The maximum distance of 3.5 m (maximum cable length) to the stand must be maintained, however. If separately installed, the generator must be bolted to the floor alternatively be attached to the wall by means of wall brackets, see further Chapter 19 "Bolting the stand/ generator to the floor".

- The separate control console can be installed in a suitable place (wall-mounted or mounted on a table, for example in an adjacent room with radiation-proof window), or be mounted onto the free-standing radiation shield (option). The connection cable to the generator measures 10 m.

Free-standing radiation shield (option)

For the installation of the free-standing radiation shield, please refer to separate instructions enclosed with the radiation shield.

Removing the generator cover

1. Pry loose the plastic strip (1) and remove the sixteen screws (2), eight on each side.

NOTICE

Pay special attention to the contact washers (there are four contact washers on either side). They are needed again when reassembling the front cover to establish protective ground connection and to fulfil EMC (Electro Magnetic Compatibility) requirements.

2. Remove the front cover (3) from the generator.

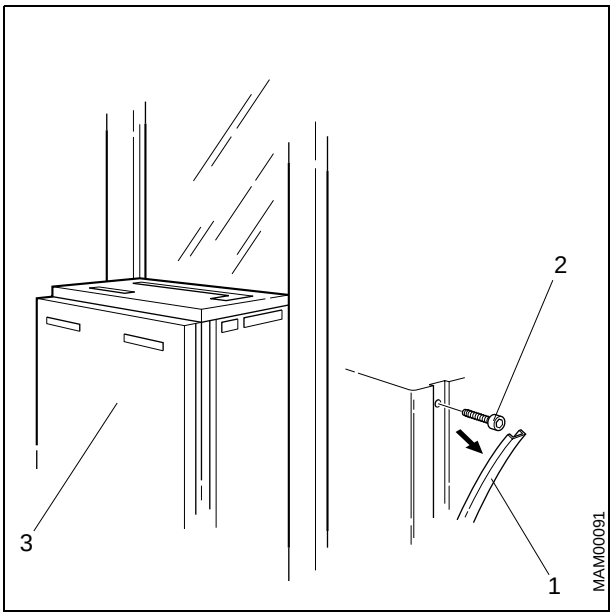

Fig. 2 Removing the generator cover

Installing the cable ducts

1. Position the cable ducts (1) to the stand and the generator respectively.
2. Leave sufficient space, approx 10 mm between the cable ducts (1) and the base plate of the stand (3) to allow for the mounting of the cable outlet cover (4).
3. Check that the cable duct (1) is slightly overlapped by the cable outlet cover (4).

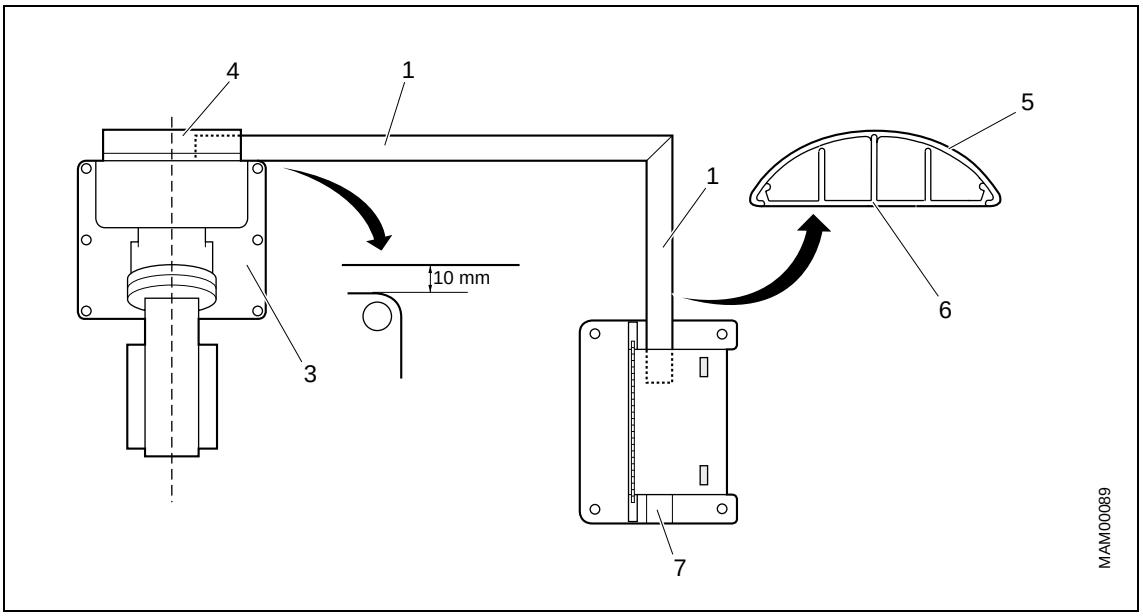

Fig. 3 Installing the cable ducts (top view)

1. Mark the outlines of the cable ducts (1) on the floor.
2. Cut the bottom of the cable ducts (6) and the cable duct cover (5) to proper length.

NOTICE

Fig. 3 shows a right-angled installation of the cable ducts. If the generator is to be installed at an other angle to the stand, you just have to cut the cable ducts correspondingly.

3. Fasten the bottom plate of the cable ducts (6) to the floor according to marking, using double-sided adhesive tape.
4. At the generator, cover the cable entry not used with the enclosed cover plate (7).

Installations with separate control console

For the connection cable separate control console – generator, additional cable ducts are required, unless the cables are to be laid underfloor.

Laying the cable harness

NOTICE **Remove the transport safeguards which consist of cable ties (four around the cable harness and one at the end of each shielded cable).**

1. Separate the cable harness.
2. Lay the stand cable harness in the cable duct, as shown in Fig. 4, all the way to the generator.
3. Fit the cable duct covers (6) onto the cable ducts.

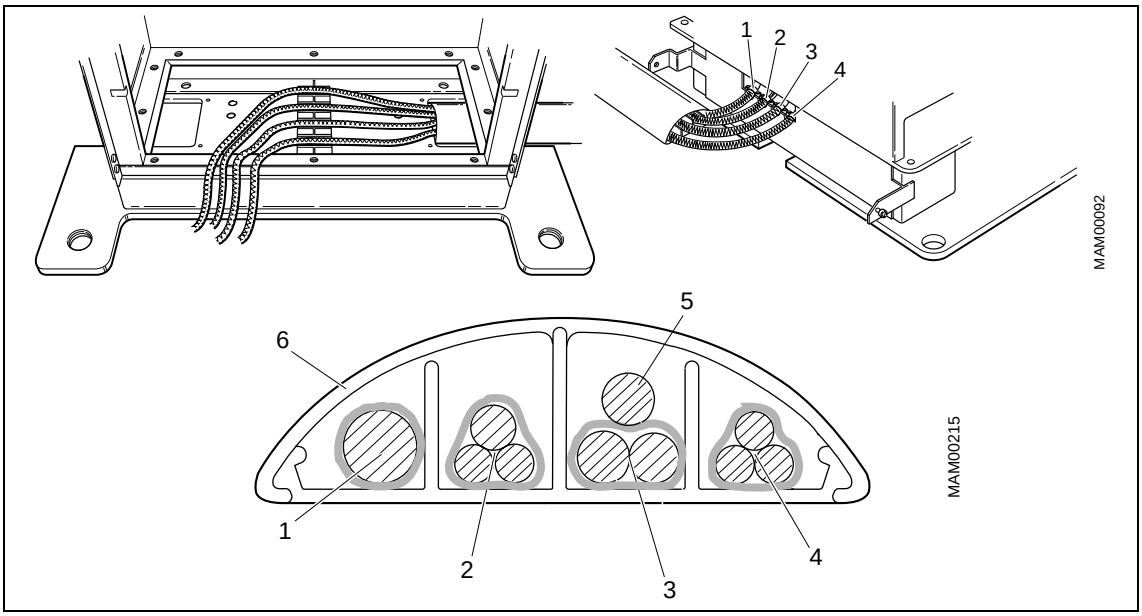

Fig. 4 Laying the cable harness

The cable harness consists of four shielded cables, see Fig. 4.

Pos in Fig. 4	Description
1	High voltage cable H1
2	IONTOMAT signal cables X10 and X11 Unit control cable X1 Power supply cable X14
3	Anode rotation cable X9 Filament cable X8
4	Mains supply cables L1, L2 Protective ground
5	Decompression-button cable (only with separate control console)

Installations with separate control console

Lay the connecting cable from the control console in additional cable ducts, alternatively underfloor, to the free cable entry of the generator, see further section Chapter 5 "Cable connections" on page 5 - 8.

The separate control console can be wall-mounted – horizontally or vertically as shown in Fig. 5 below – or be mounted on a table, either in the examination room or in an adjacent room with radiation-proof window. It is important that the control console be placed so that the operator has good view of the patient from the control console.

Ensure that the control console is attached to the wall with adequate safety margins. Dowels and screws are not supplied. Please obtain these locally and ensure that they are suitable for the material used in the wall. The separate control console has a weight of 4 kg.

There are two cable outlets on the separate control console; one at the back and one on the underside. On delivery, the cable is led through the outlet at the back of the control console. For wall-mounted control console, the cable shall be led through the outlet on the underside.

If the control console is to be mounted on a table, the minimum/maximum length of the screws penetrating into the control console must be observed, see Fig. 7 below.

The control console can also be mounted on the free-standing radiation shield (option) as shown in Fig. 6 below, see separate instructions enclosed with the radiation shield.

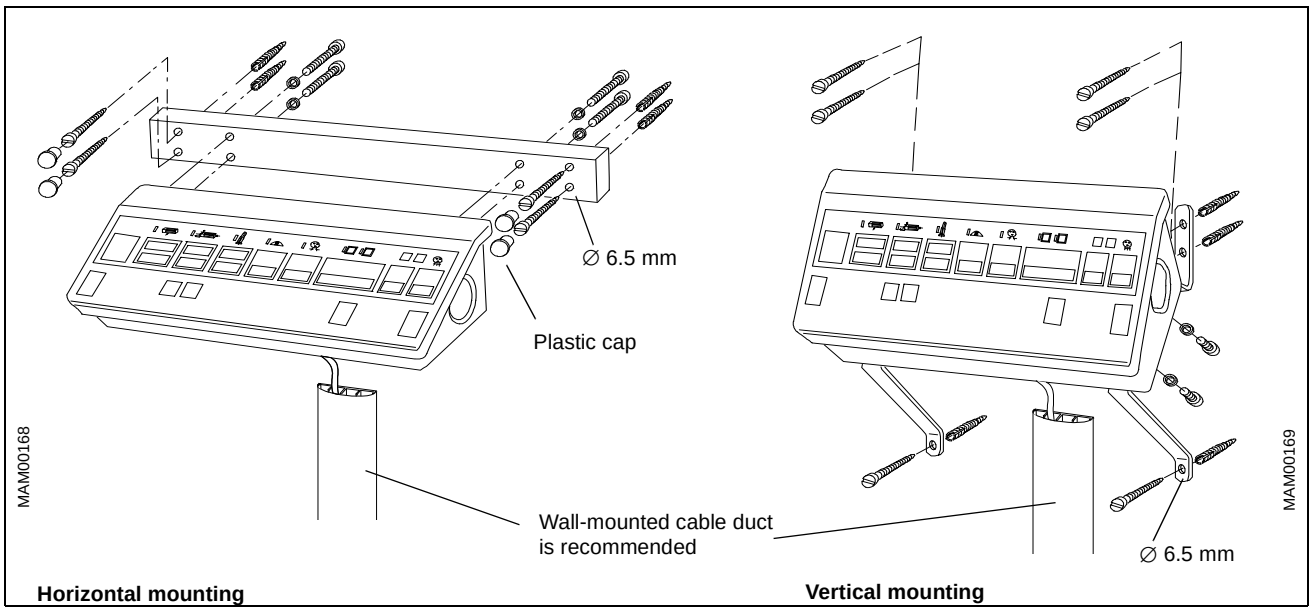

Fig. 5 Wall-mounted control console

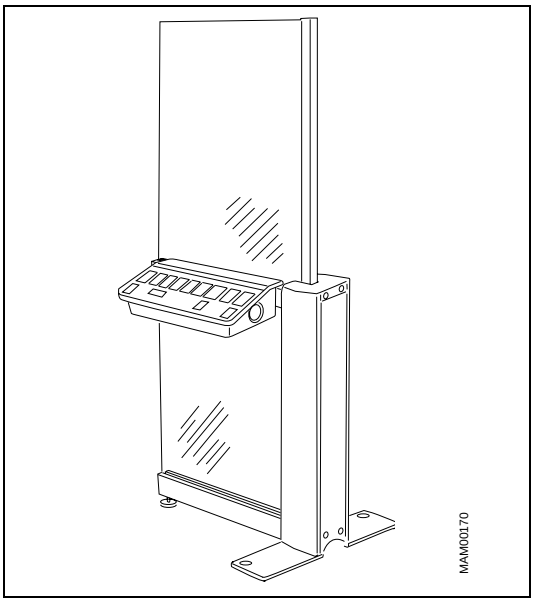

Fig. 6 Control console on free-standing radiation shield (option)

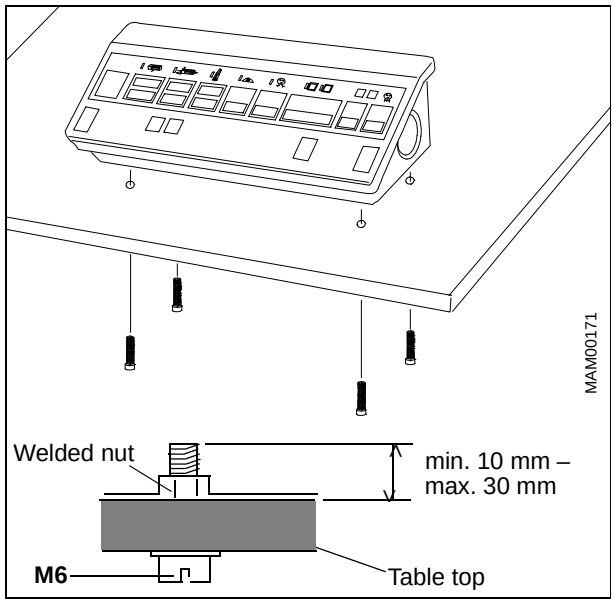

Fig. 7 Control console mounted on table

Aligning the stand

1. Align the stand vertically by means of the levelling screws (1/Fig. 8) .
   For adjustment of the levelling screws, use a ratchet spanner 1/2" with extension (without socket).

NOTICE **It is important that all six screws bear against the floor to ensure optimum stability of the stand.**

2. Cover the levelling screws with the cover discs supplied.

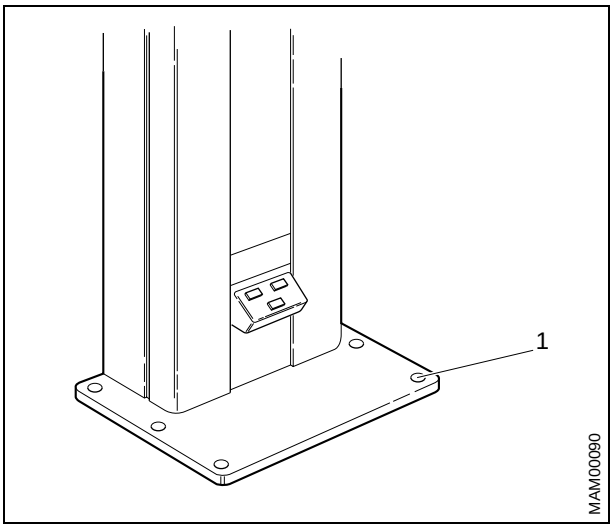

Fig. 8 Levelling screws

NOTICE **If bolting to the floor is required, please refer to Chapter 19 "Bolting the stand/generator to the floor" on page 19 - 1.**

EMC measures

The following measures are required to ensure electromagnetic compatibility of the equipment.

EMC measures at the cable entry

Fitting the hose clamps and ferrite sleeves

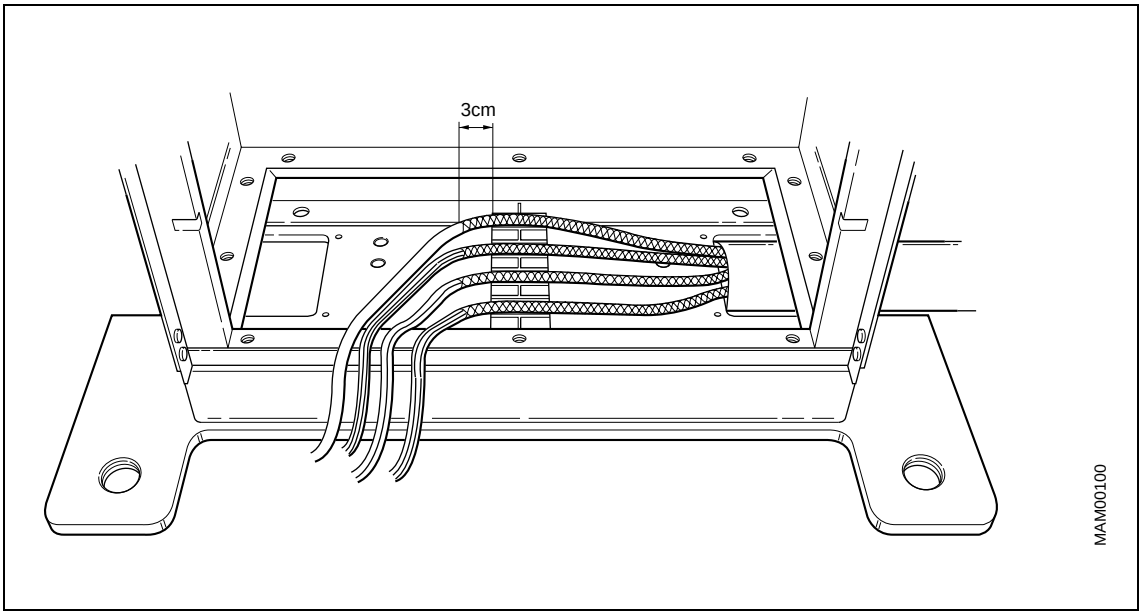

Fig. 1 Cables from the stand

1. Lay the cable harness from the stand to the generator and leave approximately 3 cm of the shielding at the U-bracket, see Fig. 1.
   Stow away excessive cable lengths as shown in Fig. 2.

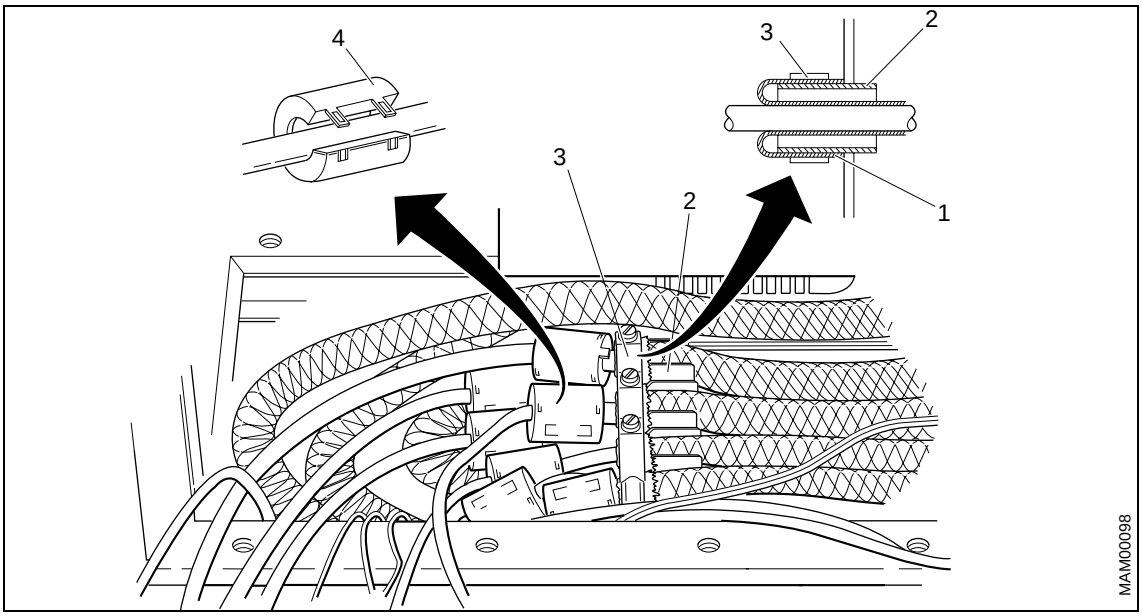

Fig. 2 Ferrite sleeves and hose clamp

2. Provide each incoming cable with a ferrite sleeve (4), except for mains supply cables L1 and L2 and the ground wire, which shall be laid together in one and the same ferrite sleeve. Ferrite sleeves are included in the delivery.
3. Provide each cable with a hose clamp (3). Hose clamps are included in the delivery.
4. Fold the shield braid (1) backwards over the U-bracket (2) on each cable and secure with the hose clamp (3).

Note on separate control console and separate generator

If the installation includes a separate control console and separate generator, please refer to page 5 - 8 for information on how to install the additional connection cable between the control console and the generator.

EMC measures on the bottom plate

Fitting the cables X1, X8 and X9 onto the bottom plate

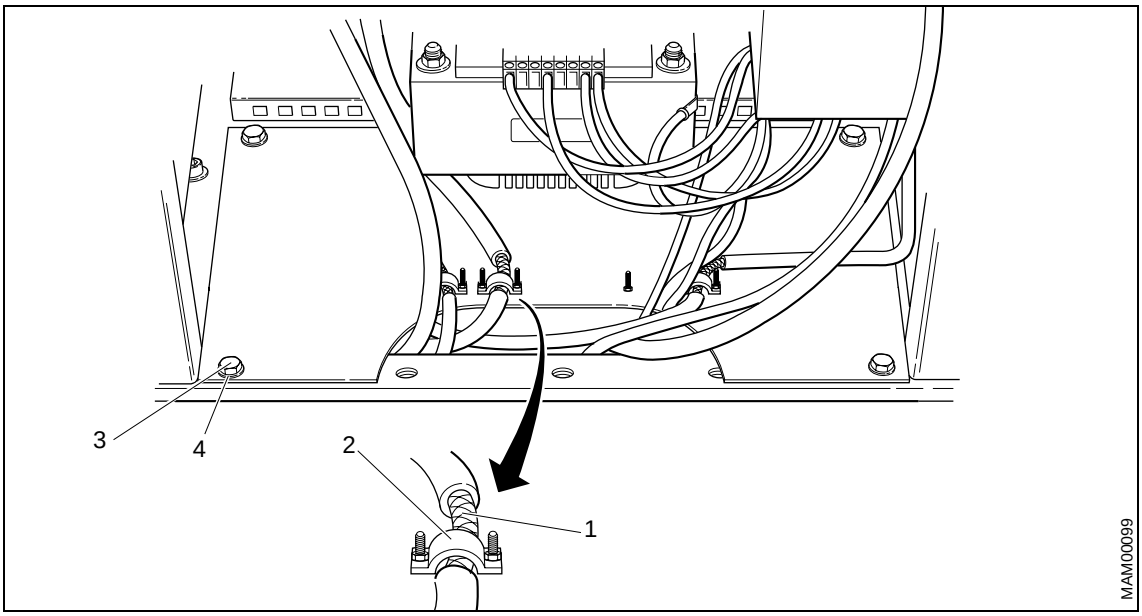

Fig. 3 Bottom plate

1. Fit the bottom plate at the bottom of the generator stand as shown in Fig. 3.
2. Carefully cut away the insulation on cables X1, X8 and X9 to lay bare the shield braid (1).
3. Select proper clamps (2) with regard to the thickness of the cables. Cable clamps in different sizes are provided on the bottom plate.
4. Fit the clamp (2) over the shield braid and screw tight to ensure satisfactory contact between shield braid and clamp.
5. Fasten the bottom plate with four screws (3) and contact washers (4).

NOTICE	**Cable X9 shall also be clamped to the side wall of the cabinet, if not already done, see Fig. 7 in this chapter.**

NOTICE	**Do not remove insulation and do not ground the shields of the IONTOMAT signal cables to X10 and X11.**

Connecting the stand cable-harness

High-voltage connectors, alternative types

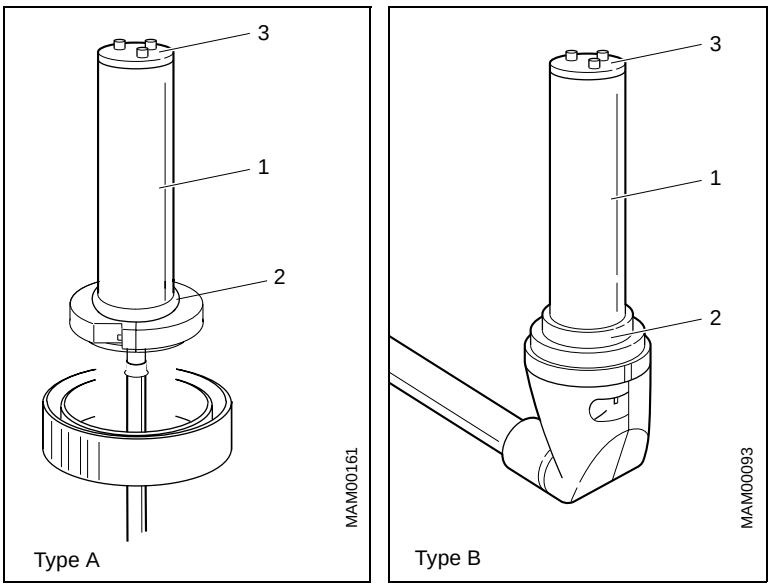

Fig. 4 High-voltage connector, alternative types

NOTICE

The high-voltage connector (1) is factory-adjusted for correct fit. Mount the angular cable-sleeve halves and sleeve nut (Type B only). The high-voltage connector shall be inserted with silicone oil, silicone-rubber ring (2) and silicone-rubber disc (3). Lubricate the silicone-rubber disc and the pins with silicon oil before mounting the disc. Make sure that there aren't any air bubbles between the disc and the connector.

Connecting the high-voltage connector

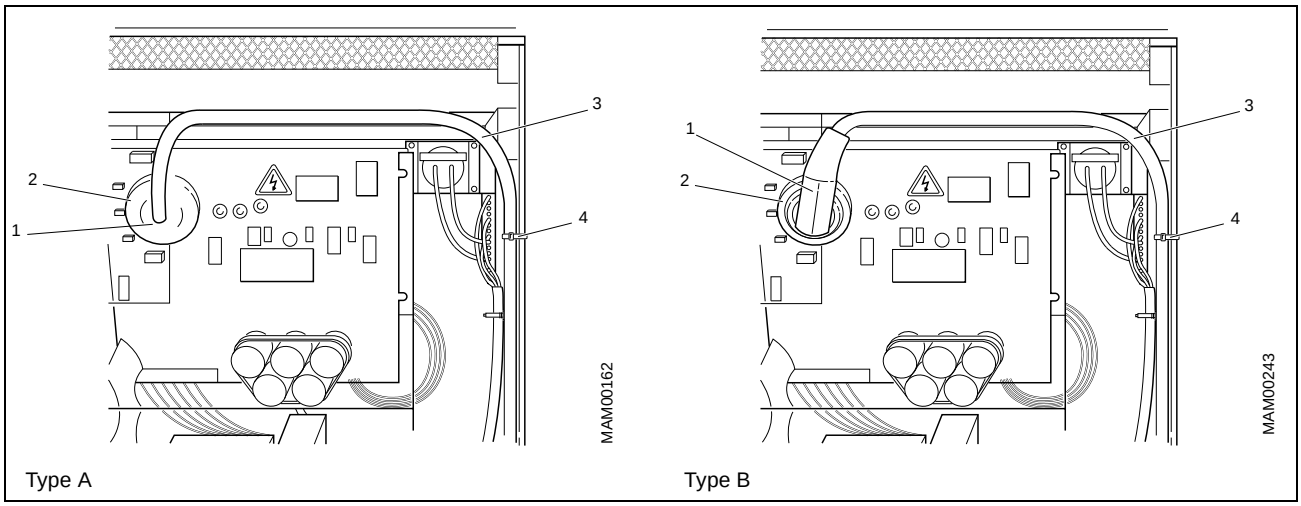

Fig. 5 Connecting the high-voltage connector, alternative types

Type A

1. Plug in the high-voltage connector (1) at H1.
2. Tighten the sleeve nut (2) by hand.
3. Tighten the stop screws on the sleeve nut.
4. Position the high-voltage cable (3) to the right in the generator and fasten with cable ties (4).

Type B

1. Plug in the high-voltage connector (1) at H1.
2. Tighten the sleeve nut (2) by hand.
3. Position the high-voltage cable (3) to the right in the generator and fasten with cable ties (4).

Connecting the cable harness to the generator

NOTICE **Required EMC measures are described on page 5 - 1 in this chapter.**

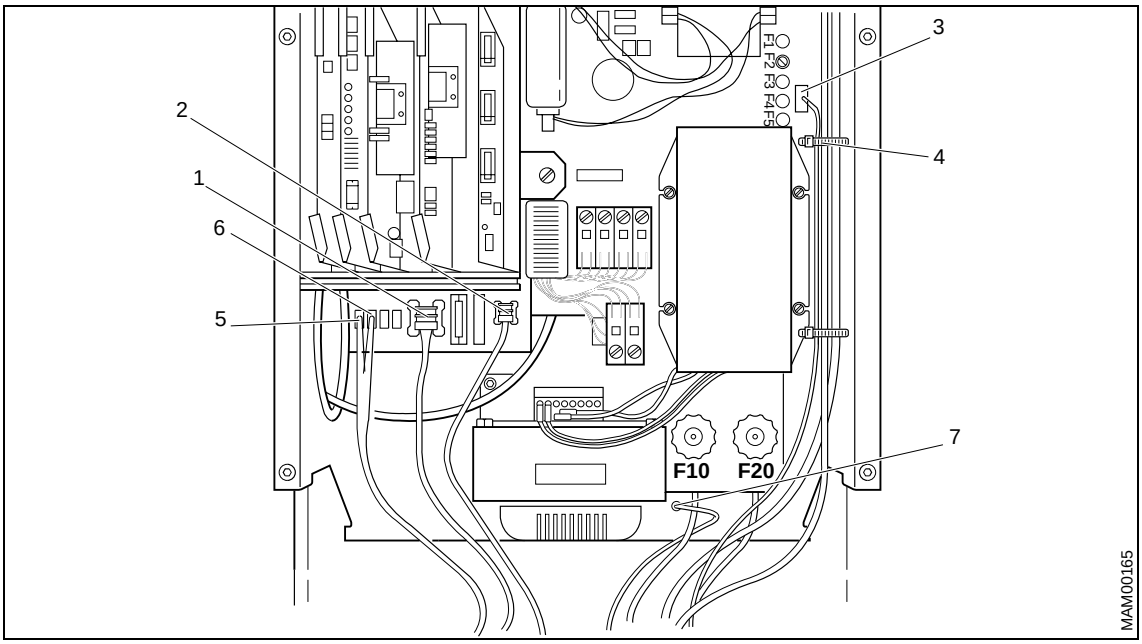

Fig. 6 Cable harness at the generator

Unit control cable X1

1. Connect the unit control cable X1 to D700 X1 (1).

Filament cable X8

1. Connect the filament cable X8 to D700 X8 (2).

Power supply cable X14

1. Connect the power supply cable X14 to D711 X14 (3).
2. Strain-relieve it on the side with a cable tie (4).

IONTOMAT signal cable X10 and X11

NOTICE **The Iontomat signal cable consists of two cables laid together as one cable with two connectors labeled X10 and X11 at the end of the cable.**

1. Connect the IONTOMAT signal cable connectors, X10 and X11, to D700 X10 (5) and X11 (6).

Rotating anode cable X9

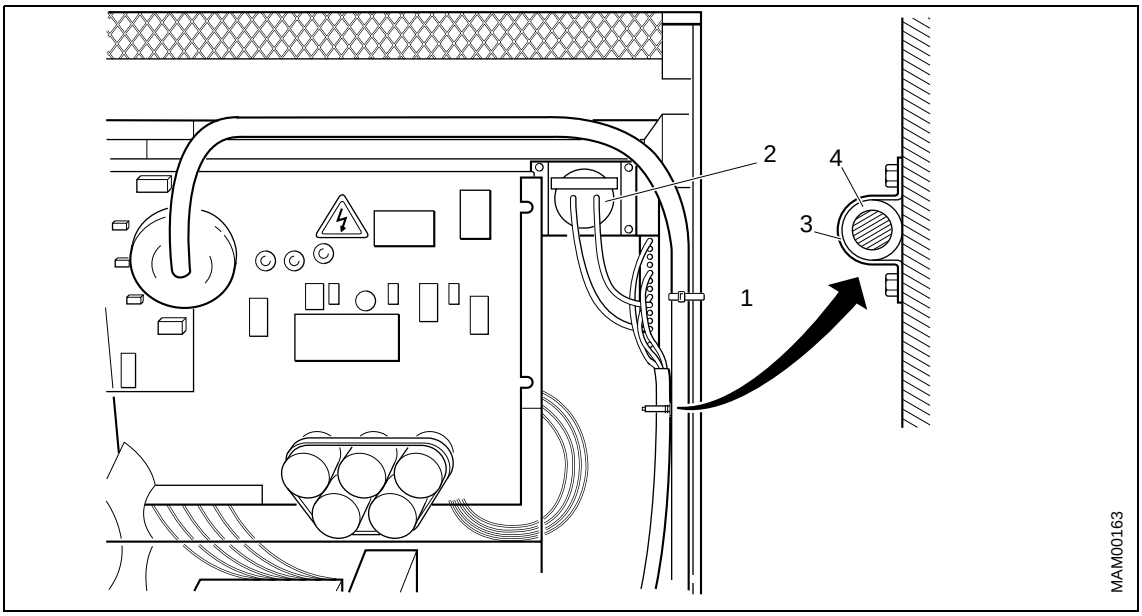

Fig. 7 Connecting X9 to the generator

1. Connect the rotating anode cable X9 to D711 X9 (1).
2. Connect the two blue free wires from connector D711 X9 (1) to capacitor C51 (2).
3. Clamp the cable to the chassis with a cable clamp (3).

CAUTION **When fitting the cable clamp, ensure satisfactory contact between shield braid (4) and chassis.**

Installations with separate control console and separate generator

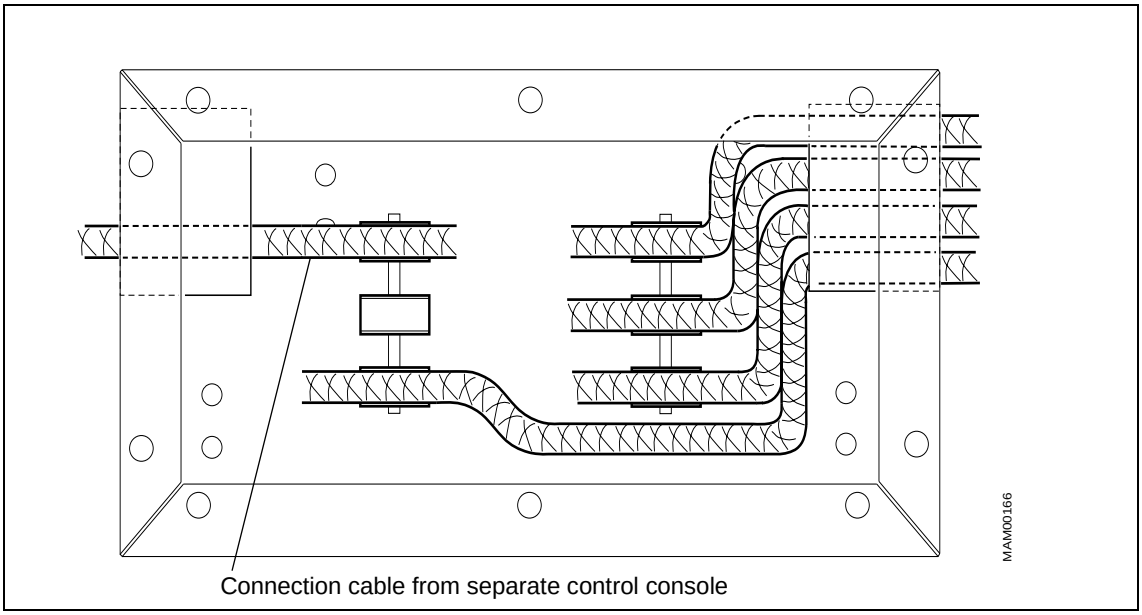

Fig. 8 Connection cable from separate control console

NOTICE **Shielding the cable from the separate control console as described below is an absolute demand to comply with the EMC regulations.**

1. Lay the connection cable from the separate control console in additional cable ducts, alternatively underfloor, to the free cable entry of the generator, see Fig. 8.
2. Lay the connection cable in a free U-bracket. Fold the shield braid over the U-bracket and secure with a hose clamp as shown in Fig. 9.

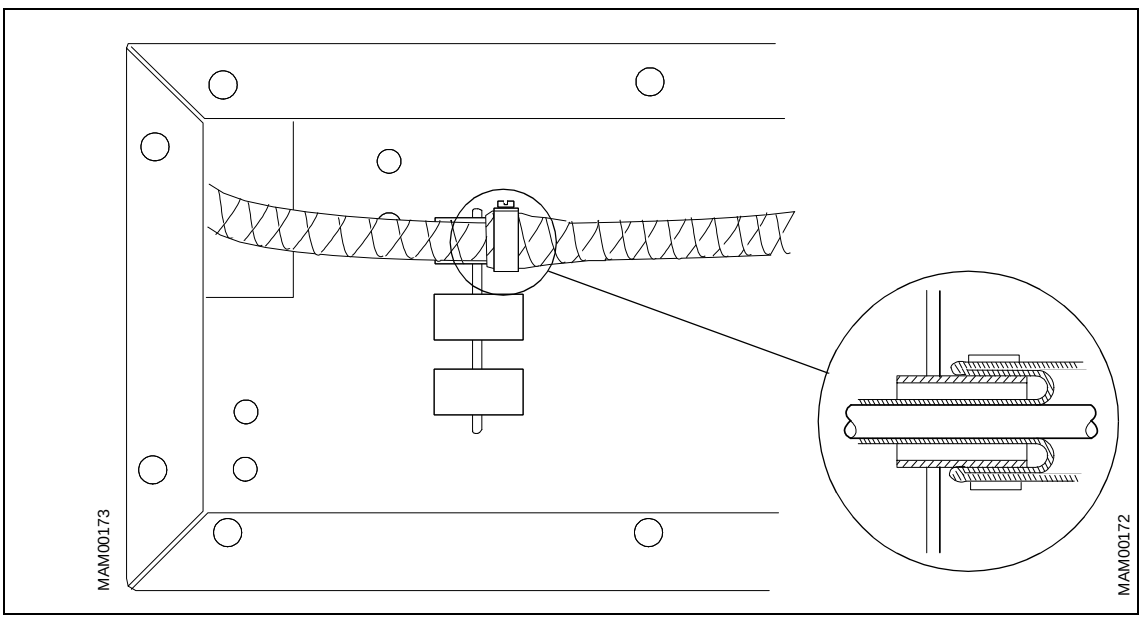

Fig. 9 Shielding the control console cable

3. Shield the control console cable to the bottom plate of the generator as shown in Fig. 10.
4. Provide the cables with ferrite sleeves. Cables X5 and X32 can be laid together in one ferrite sleeve, X30 and the decompression-button cable in another sleeve (two extra ferrite sleeves are included in the delivery). Plug together the decompression button cables. Shield the decompression button cable to the bottom plate , see Fig. 10. Lay the decompression button cable in the cable duct, alter-natively underfloor, to the stand, see Fig. 4 in Chapter 4 "Installing the generator and the stand".

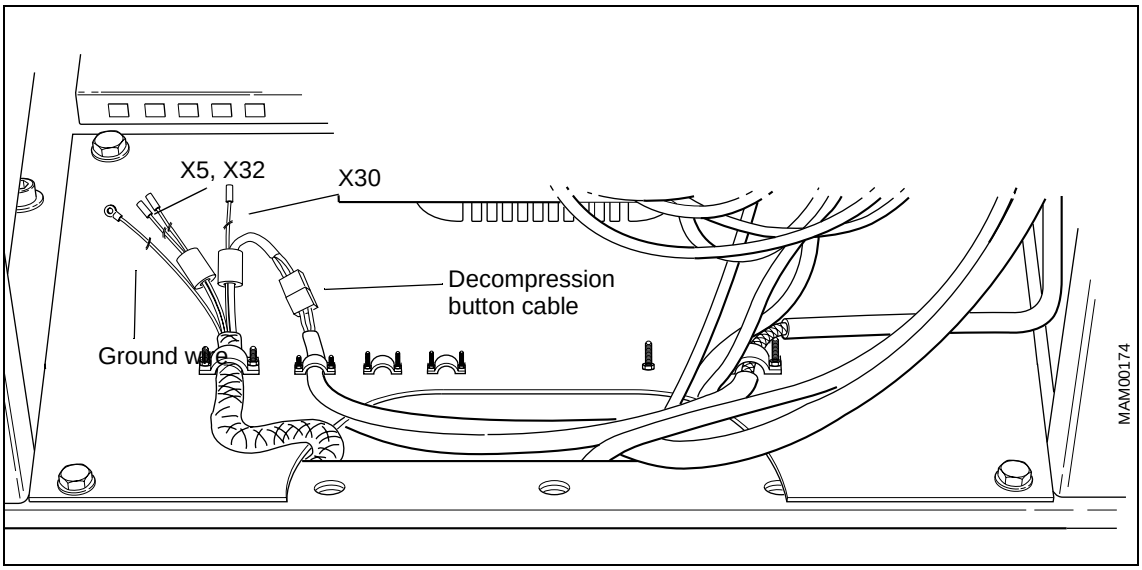

Fig. 10 Cables from separate control console

5. Connect X5 and X32 to the corresponding sockets on circuit board D700, X30 to connector T3/X30 at the side of the circuit board chassis. Connect the ground wire to the protective ground terminal below fuse F10, see Fig. 11.

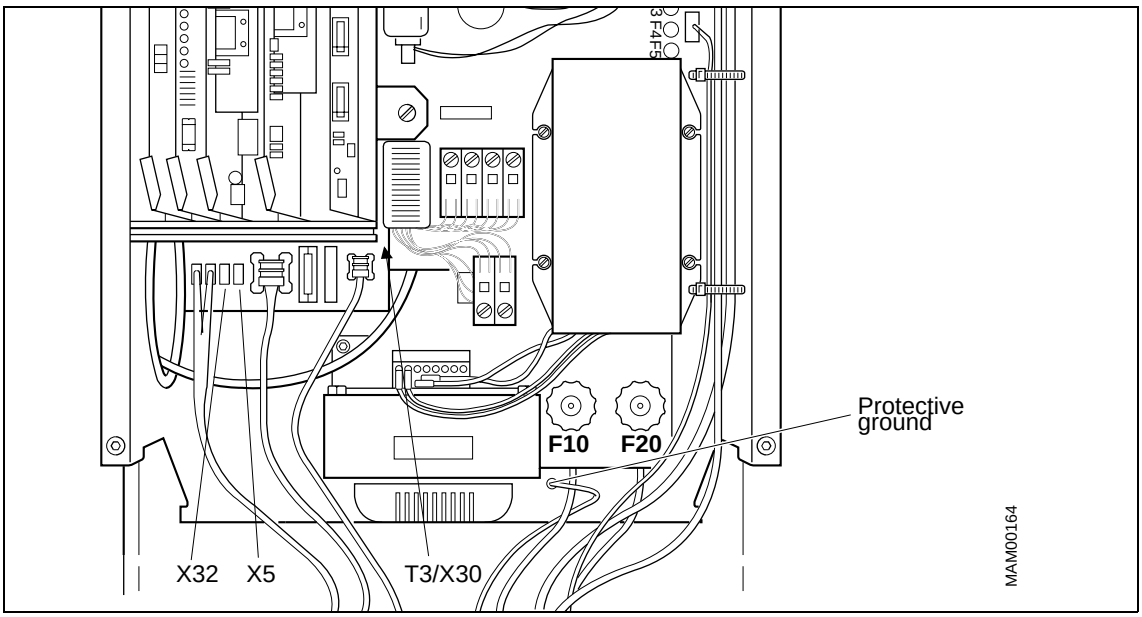

Fig. 11 Connecting the cables from the separate control console

6. Shield the decompression button cable to the stand chassis as shown in Fig. 12. Connect to terminals 2 and 3 in terminal block X803 on the inside of the stand chassis, see Fig. 12.

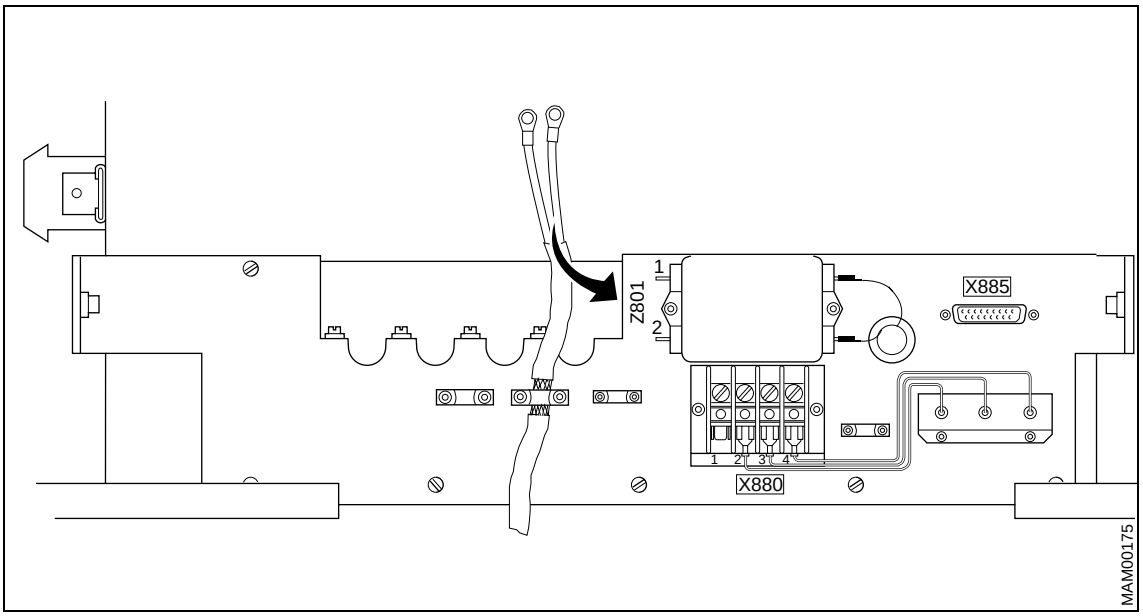

Fig. 12 Connecting the decompression button cable at the stand

Main voltage connection

The equipment has been set to 400 V, 2-phase, in the factory (see test certificate). Adjustment to the line frequency is not needed. If the mains voltage is not 400 V, 2-phase at the installation site, a reconnection of the mains is necessary.

Should a reconnection for the mains voltage be necessary, this must be done at transformer T10 as well as p.c. board D711 (insertion or removal of fuses and labeling is specified in the wiring diagram, see Line Input page 5-3).

Change the rated voltage labels to the correct voltage (there are two labels on the generator and one on the stand). Labels are included in the installation material.

NOTICE	**For more details about changing mains, insertion or removal of jumpers, fuses, labeling etc, see Wiring Diagram.**

Connecting the incoming mains to the stand (400 V, 2-phase)

400 V 2-phase connection

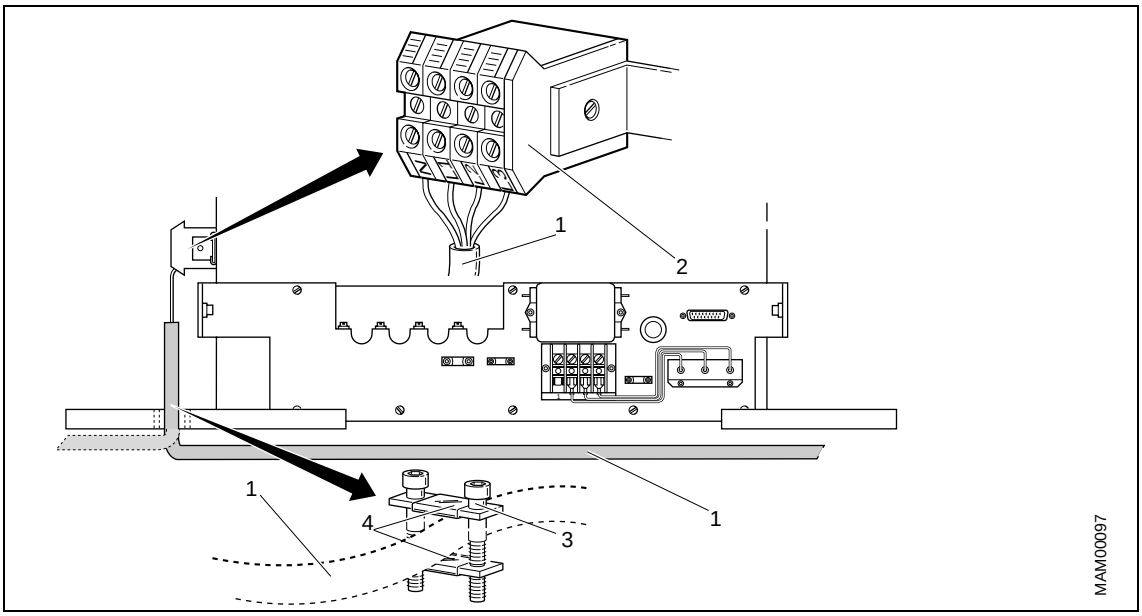

Fig. 13 Incoming mains cable

1. Connect the incoming mains cable (1) to X899 (2) in the stand as shown in Fig. 13 and Fig. 14.
2. Fit plastic tubes (4) on the plates.
3. Strain-relieve (3) the incoming mains cable.

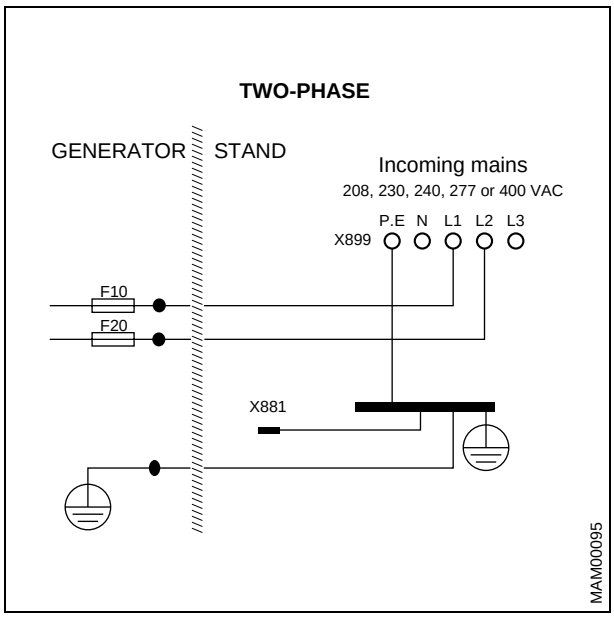

Fig. 14 Incoming mains, 2-phase

Connecting the mains supply to the generator (400 V, 2-phase)

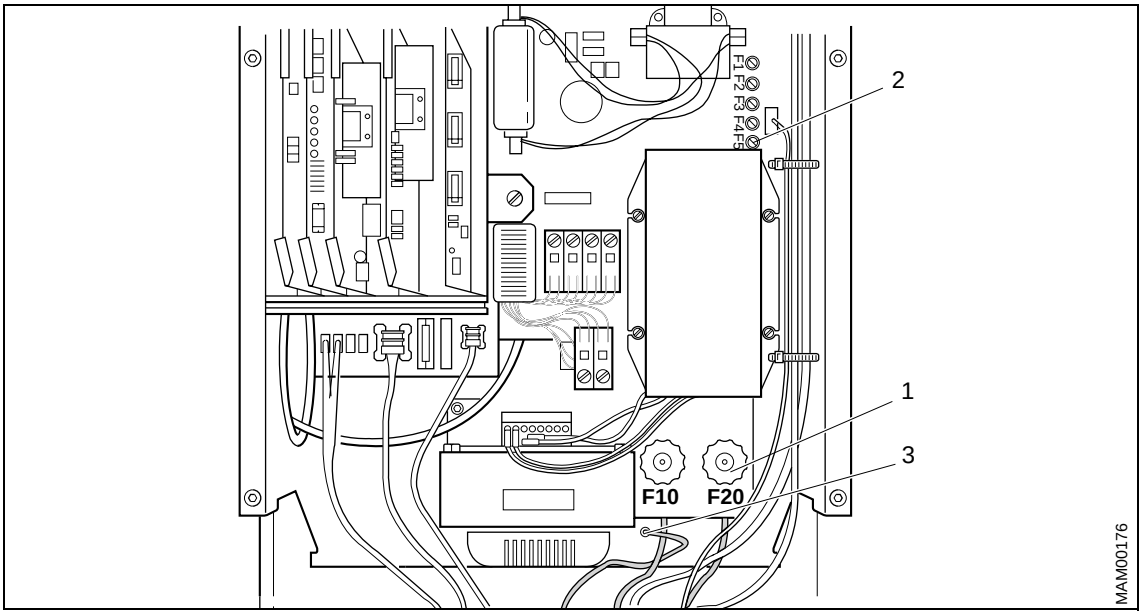

Fig. 15 Mains supply to the generator

1. Check that there is no wire jumper at F20 (1) and no brass plug at F5 (2).
   Fuses must be inserted into fuse holders F20 and F5.
2. Connect the mains supply cables between stand and generator to fuses F10 and F20 on the generator.
   Wire marked L1 to F10 and L2/N to F20.
3. Connect the protective ground wire from the stand to the generator (3).

Measures for changing from 2-phase to 1-phase connection

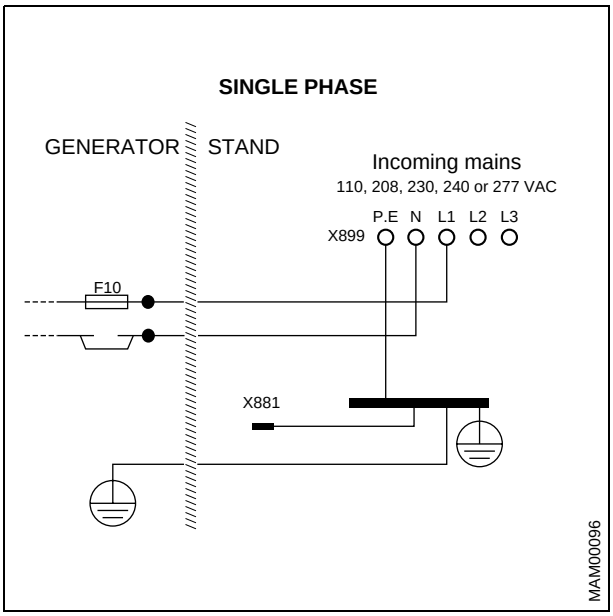

Fig. 16 Incoming mains, 1-phase

1. Move wire marked N/L2 from X899 L2 to X899 N (stand).
2. Connect incoming phase of the power supply to L1 and the neutral conductor of the power supply (0 V) to N and fuse F20.
3. Strain-relieve the incoming mains cable as shown in Fig. 13.
4. Short circuit F20 (1) and F5 (2) in Fig. 15 with the jumper and brass plug included in the service bag.

CAUTION

For single-phase mains connection, make sure that the neutral conductor of the power supply (0V) is connected to terminal N and fuse F20.

NOTICE

Connections on transformer T10 must be adapted to the actual mains voltage, see Wiring Diagram for details.

5. Connect the mains supply cable between stand and generator to fuses F10 and F20 on the generator. Wire marked L1 to F10 and L2/N to F20.

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Checks before powering up the generator

On P.C. board D702:

1. Set switch S1(UZW) to "OFF" (lower position).
2. Set switch S2 (SS) to "OFF" (lower position)

.

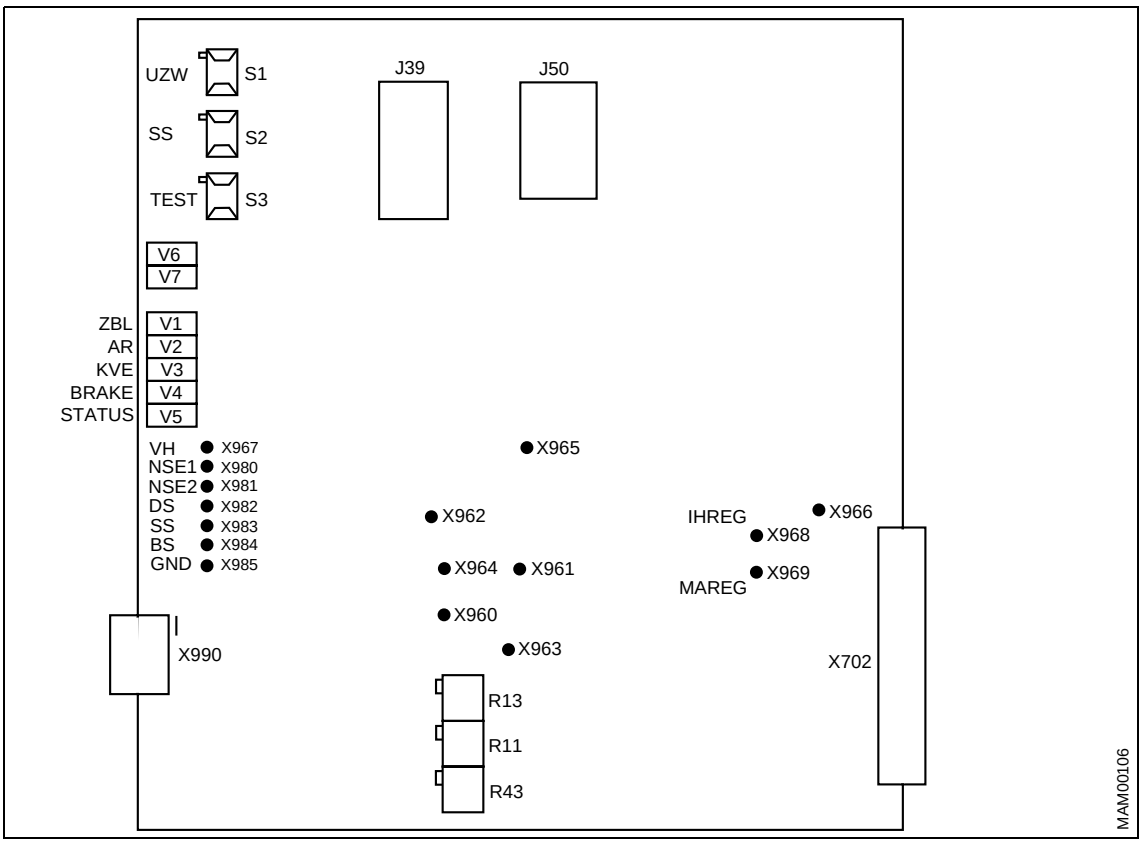

Fig. 1 P.C. board D702

Measuring the line resistance

See Fig. 2.

1. Remove fuses F10 (1) and F20 (2) or, when single-phase supply, fuse F10 (1).
2. Connect line resistance meter to fuse holders F10 and F20.
3. Mains supply "ON".
4. Carry out measurement.
5. Mains supply "OFF".

To achieve the full output, the resistance measured must not exceed the following values:

- 0.25 Ω at 110 V (1-phase)
- 0.45 Ω at 208 V
- 0.50 Ω at 230 V
- 0.60 Ω at 240 V
- 0.65 Ω at 277 V
- 0.85 Ω at 400 V (2-phase)

If the above values are exceeded, reduce the generator power in accordance to Chapter 13 "Checking the swivel-arm system" in this manual.

Checking the line voltage in the generator

1. If not already done, remove fuses F10 (1) and F20 (2) or, when single-phase supply, fuse F10 (1).

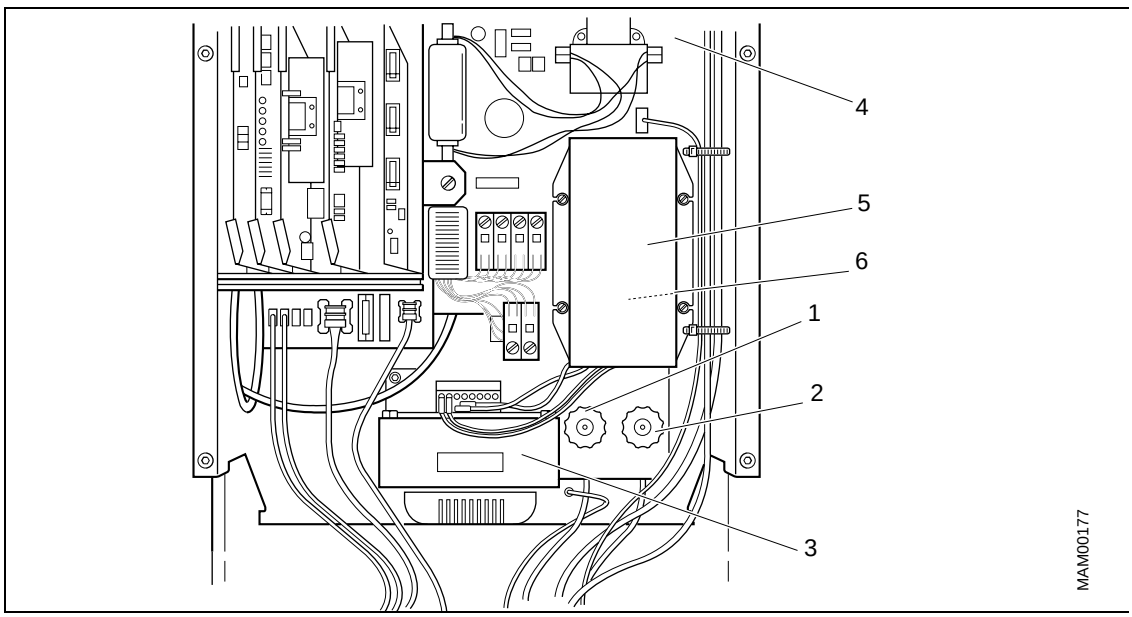

Fig. 2 Line voltage in the generator

2. Mains supply "ON".
3. Measure the voltage at fuse holders F10 (1) and F20 (2).
4. Check that the mains voltage agrees with the voltage plugged on transformer T10 (3) and P.C. board D711 (4), located above line filter Z1 (5).
5. Mains supply "OFF".
6. Reinsert fuses F10 (1) and F20 (2).
7. Mains supply "ON" **(Do not switch the system on yet)**.
8. Measure the voltage at transformer T1 (6) terminals 1 and 3, transformer T1 is located under the line filter Z1 (5). There must be 195 V- 253 V between the terminals.
9. Measure the voltage at the output of line filter Z1 it must lie within 195 V- 264 V.

Checking the supply voltages

The correct supply voltages +5 V, +15 V and +24 V have already been tested in the factory. Only a visual check of the function is therefore needed.

1. System "ON".
2. Check that the following orange diodes are "ON" on p.c. board D704:

   V39 (+15 V)

   V38 (-15 V)

   V41 (+5 V)

   V40 (+24 V)

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Attaching the swivel-arm covers

Arranging the swivel-arm system

1. Remove the cable tie securing the balancing spring at the back of the stand.
2. Install object table, no compression force (swivel-arm system still upside down).
3. Remove the protective strips from the metal curtain.
4. Run the lifting carriage upwards.
5. Put back the protective strips onto the metal curtain.
6. Rotate the swivel-arm system to 0 degrees by pressing one of the switches for clockwise rotation on the supporting arm.
7. System and mains "OFF".
8. Remove the swivel-arm system transport safeguard, see Chapter 3 "Preparatory work".

Connecting the cables to control-button boards and patient handles

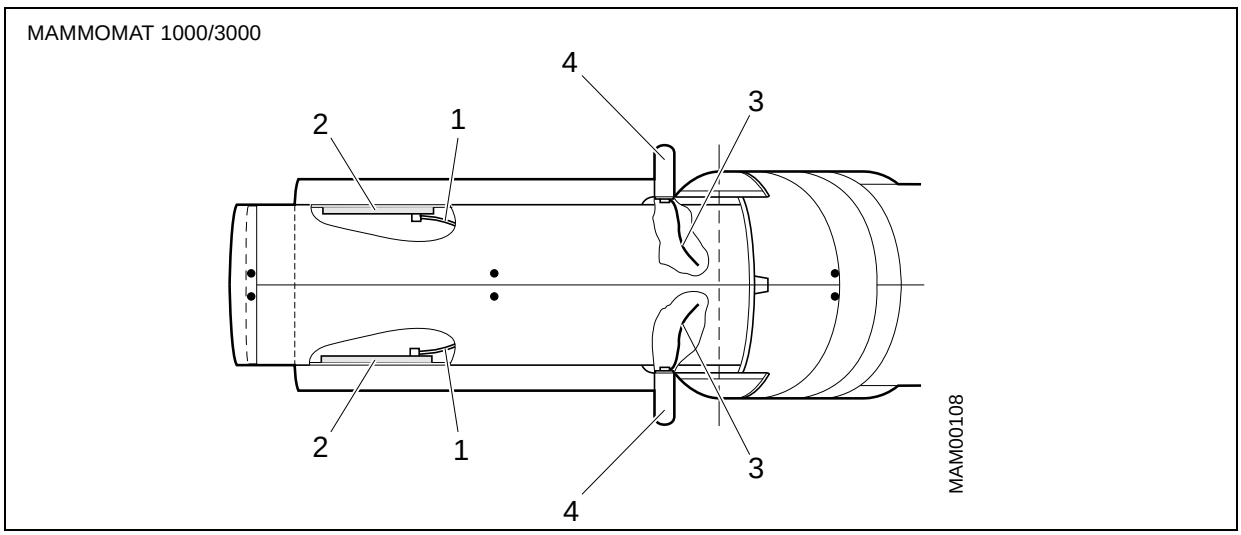


Fig. 1 Connecting the cables

Before installing the side covers, the cables are to be connected.

MAMMOMAT 1000/3000

1. Connect cables X807 (1) to control-button circuit boards D807 (2).
2. Connect ground wires (3) to patient handles (4).

Attaching the side covers

Screws in different sizes are included in the delivery.

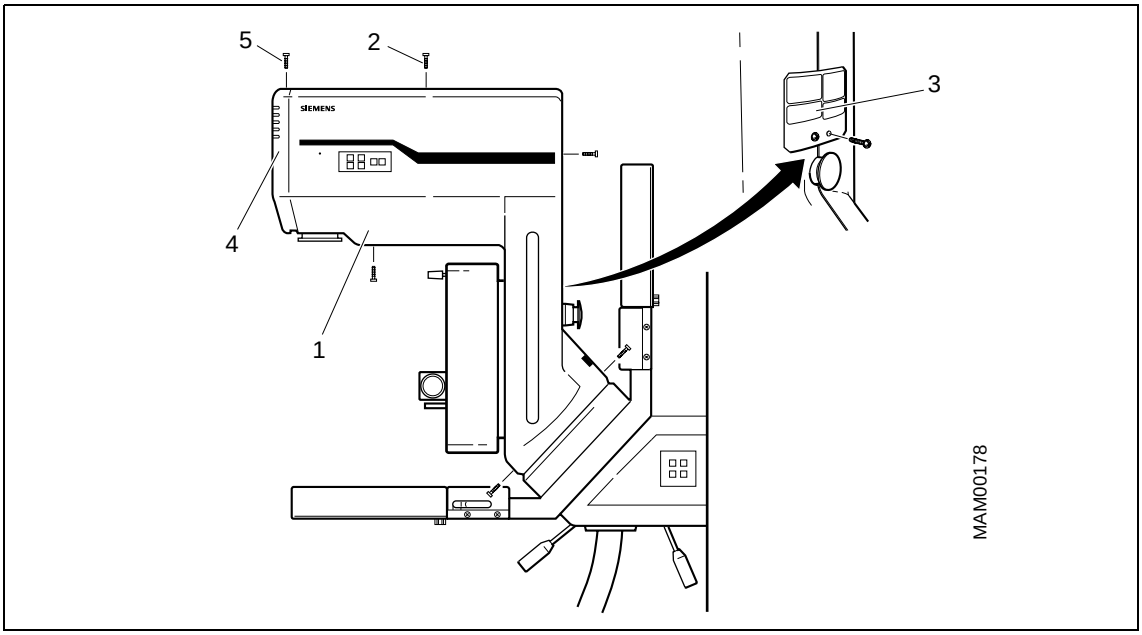


Fig. 2 Covers and sign

1. Mount the side covers (1) with six screws (2) on each side.

NOTICE **Do not forget to fit the sign (3) when mounting the side covers. Use the two longer screws.**

Attaching the front cover

CAUTION **Because of the risk of damages, the following work must be carried out with caution. If the covers are exposed to internal stress due to poor fit, cracks might arise.**

1. The side covers must be flush at the front. If necessary, loosen the screws and adjust the side covers.
2. Carefully fit the front cover (4) so that both openings engage with the lugs of the side covers.
3. Carefully swing the front cover upwards and let it snap in position over the side covers.

CAUTION **The front cover must not press against the collimator (risk of damage).**

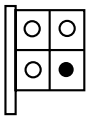
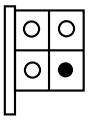
4. Fasten the front cover to the side covers with two short screws (5).

Microprocessors

The following LED displays on the processor P.C. boards indicate whether the relevant microprocessors are operating correctly.

1. Mains and system "ON".

   The following conditions must be indicated after not more than 15 s.

Microprocessors for:	LED displays
Master: P.c. board D702	 ○ Must be off. ● Flashing rapidly.
IONTOMAT PM: P.c. board D701	 ○ Must be off. ● Must be flashing (2-3 Hz).

MAM00110

   P.C. board D711:

   - V9 "ON" (line voltage on).
   - V13 "OFF" (system stand-by).
   - V11 "ON" (system on).
   - V16 "ON" (intermediate circuit - filament).

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Checks without high voltage

1. System "OFF".
2. On P.C. board D702 set switch S1 (UZW) to "ON" (upper position) and switch S2 (SS) to "OFF" (lower position).
3. System "ON".
4. Insert a cassette.

NOTICE **The cassette must be removed and reinserted after each exposure to allow for the next exposure release. This is to avoid double exposures.**

5. Press the exposure buttons on the control panel. The rotating anode shall start up. At the end of the limit time, the rotating anode is braked.
6. Release the exposure buttons.
7. System "OFF".

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Preparation

This section describes how to check:

- Radiographic voltage.
- Tube current.
- mAs values.

⚠WARNING	**Radiation ☢**
NOTICE	**Check that the high-voltage plug is plugged into H1 and properly secured.**

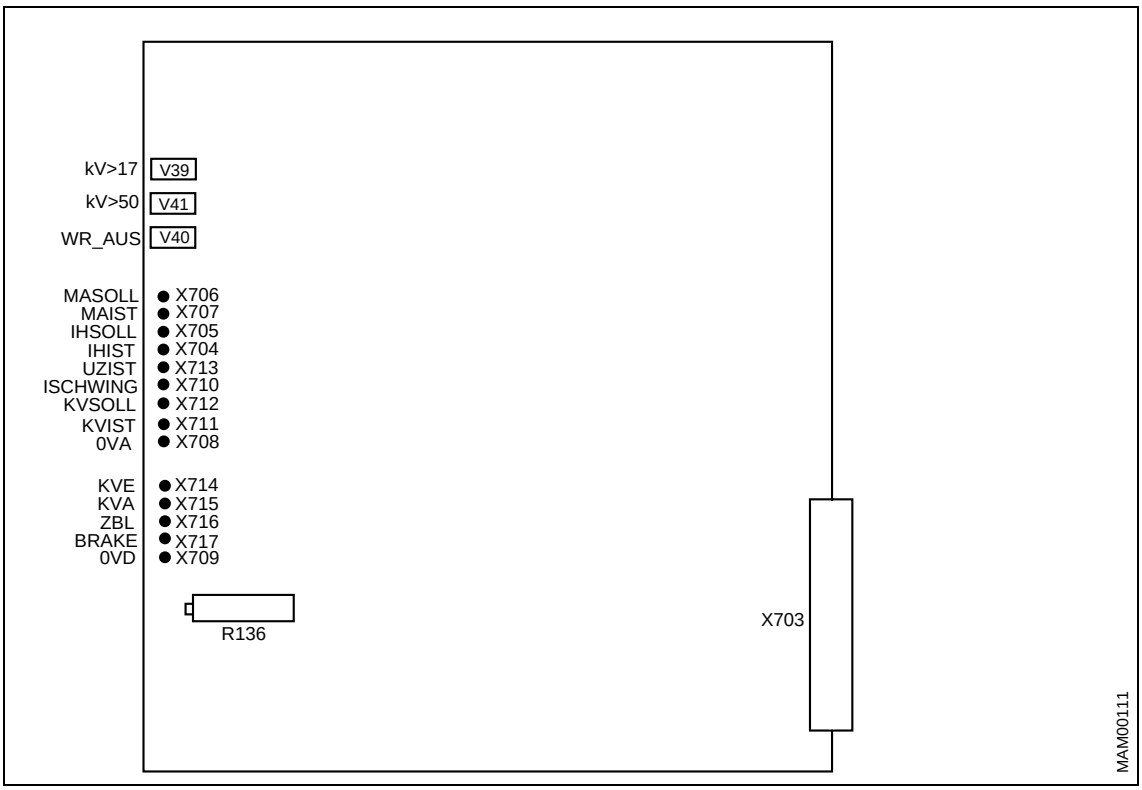

Fig. 1 P.C. board D705

1. Set switch S2 (SS) to "ON" (upper position) on P.C. board D702.
2. Remove the jumper and connect the mAs meter to mAs measuring sockets X3 and X4 on P.C. board D710.

3. Connect oscilloscope to P.C. board D705 as follows:
   - Channel 1 to measuring point "KVIST(actual value)" (1 V= 5 kV).
   - Channel 2 to measuring point "MAIST(actual value)" (1 V= 40 mA).
   - Trigger at measuring point "KVE" (start with high voltage "ON"), rising edge.
   - Twist the measuring leads and connect their grounding braids to measuring point "0 VA".
4. Connect service PC to circuit board D702 using the connection cable.

NOTICE	**Switch S3 on circuit board D702 must be set to upper position.**

5. Start service program, see Chapter 20 "Appendix".
6. Check the anode menu for correct selection (tungsten anode enabled or disabled, depending on which type of X-ray tube the customer has choosen). See Service Program Instructions RX B7-230.114.01. ... .

NOTICE	**It is possible to select tungsten anode, even if the customer does not have this option. However, the 50 µm Rh filter will then be missing.**

Checking X-ray tube high voltage, tube currrent and mAs values

1. System "ON".
2. Set the "cassette loaded" switch to "OFF" with the service PC program: **Configuration** - **Miscellaneous** - **Cassette loaded check**.
3. Trigger test exposures with the following exposure values and check the kV values and tube current characteristic on the oscilloscope (see oscillograms).
   The accuracy of the kV is ±5% plus ±1.5 kV during the first 5 ms of the exposure.
   For mA values < 50 mA, the accuracy of the kV is ±5% plus ±2 kV during the first 5 ms.
   The tube current must rise quickly to the set value at the beginning of the exposure and run linearly during the exposure, however, not when TCR is running.
   The accuracy of the mAs product must be ±10%.
4. Replace the jumper previously removed.

Tube current reduction

NOTICE	**In MAMMOMAT, the tube current reduction is factory-set to "ON" (see Chapter 12 "Further programming" and test certificate). In this way, the tube current is reduced to approximately 50 mA at the start of the exposure during the time programmed in Chapter 12 "Further programming". The tube current reduction is effective only in IONTOMAT mode with Bucky.**

Oscilloscope diagrams

- MAMMOMAT in mAs mode, see Fig. 2 - Fig. 9.
- MAMMOMAT with tube current reduction switched on, Iontomat mode with Bucky, see Fig. 10 - Fig. 11.
- MAMMOMAT in Iontomat mode with tube current reduction switched off, see Fig. 12 - Fig. 13.

NOTICE

Checks indicated by * shall be disregarded in installations with filter disc Mo 0.03 / Rh 0.025 (molybdenum rotating anode).

Tube P40 MoW, MAMMOMAT 3000

*** tungsten anode 0.3**

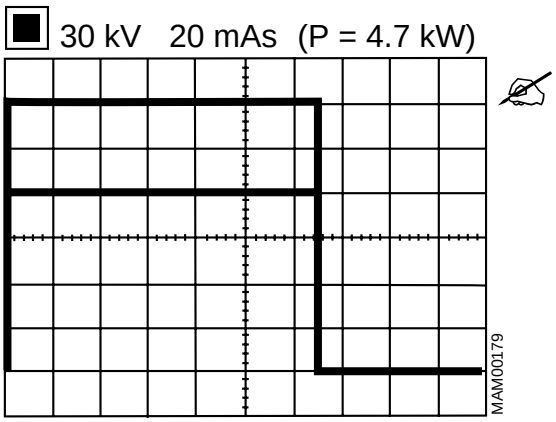

Fig. 2

30 kV	1 V/T (1 T <=> 5 kV)
158 mA	1 V/T (1 T <=> 40 mA)
127 ms	20 ms/T

Tube P40 MoW, MAMMOMAT 1000/3000

molybdenum anode 0.3

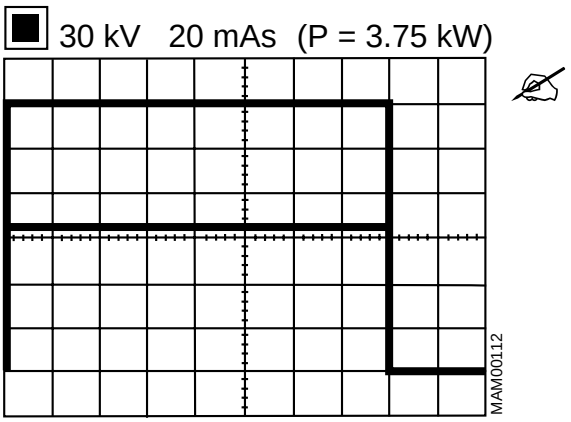

Fig. 3

30 kV	1 V/T (1 T <=> 5 kV)
125 mA	1 V/T (1 T <=> 40 mA)
160 ms	20 ms/T

NOTE

Record the measured kV and mAs value in the measuring protocol, page 20 - 3.

Tube P40 MoW, MAMMOMAT 3000

*** tungsten anode 0.3**

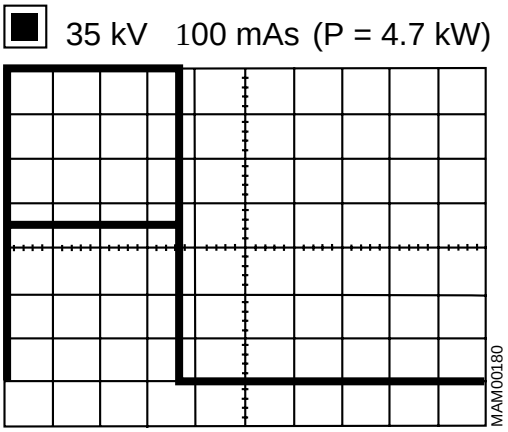

Fig. 4

35 kV	1 V/T (1 T <=> 5 kV)
134 mA	1 V/T (1 T <=> 40 mA)
0.75 s	0.2 s/T

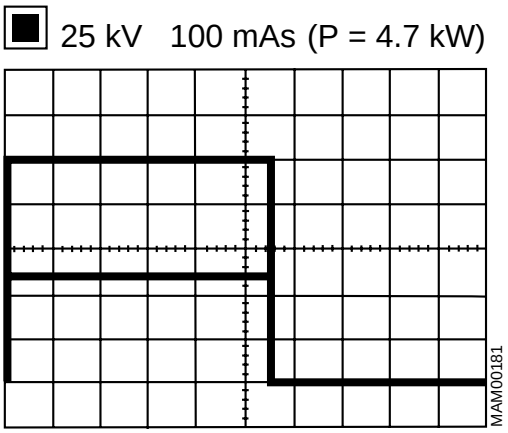

Fig. 6

25 kV	1 V/T (1 T <=>5 kV)
188 mA	2 V/T (1 T <=> 80 mA)
0.53 s	0.1 s/T

Tube P40 MoW, MAMMOMAT 1000/3000

molybdenum anode 0.3

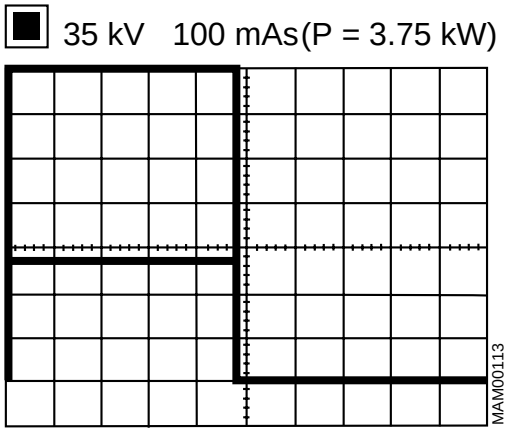

Fig. 5

35 kV	1 V/T (1 T <=> 5 kV)
107 mA	1 V/T (1 T <=> 40 mA)
0.93 s	0.2 s/T

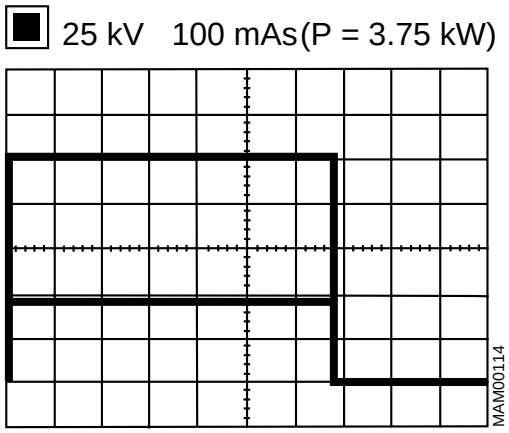

Fig. 7

25 kV	1 V/T (1 T <=> 5 kV)
150 mA	2 V/T (1 T <=> 80 mA)
0.67 s	0.1 s/T

Tube P40 MoW, MAMMOMAT 3000

*** tungsten anode 0.15**

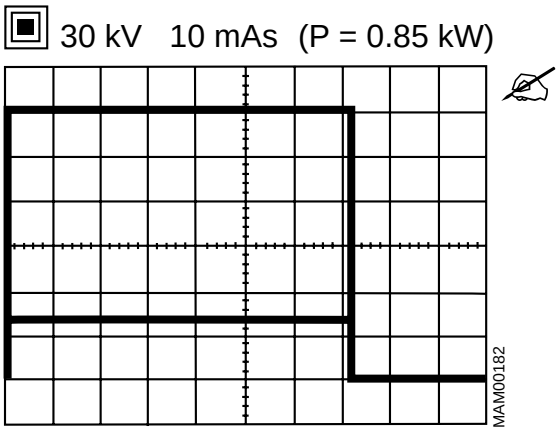

Fig. 8

30 kV	1 V/T (1 T <=> 5 kV)
28 mA	0.5 V/T (1 T = 20 mA)
360 ms	50 ms/T

Tube P40 MoW, MAMMOMAT 1000/3000

molybdenum anode 0.15

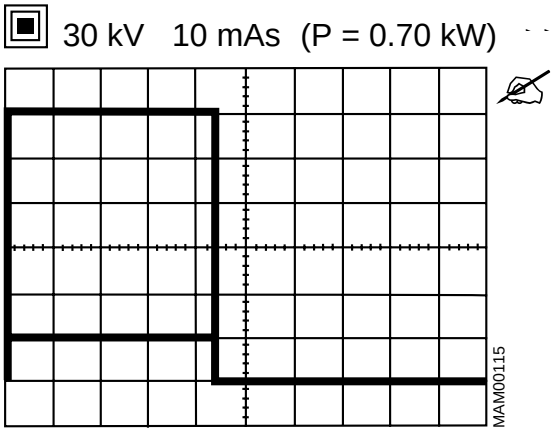

Fig. 9

30 kV	1 V/T (1 T <=> 5 kV)
23 mA	0.5 V/T (1 T <=> 20 mA)
430 ms	100 ms/T

NOTICE	**Small focus is selected by attaching a magnification table.**
NOTICE	**Record the measured kV and mAs value in the measuring protocol, page 20 - 3.**

Tube P40 MoW, MAMMOMAT 3000

*** tungsten anode 0.3**

30 kV Iontomat w. grid (P = 4.7 kW)
40 mm plexiglass

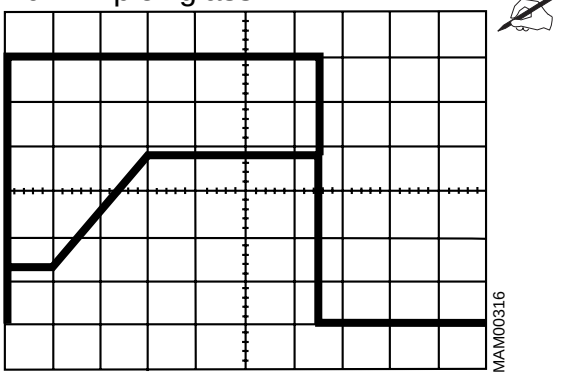

Fig. 10

30 kV	1 V/T (1 T <=> 5 kV)
158 mA	1 V/T (1 T = 40 mA)
*)	100 ms/t

Tube P40 MoW, MAMMOMAT 1000/3000

molybdenum anode 0.3

30 kV Iontomat w. grid (P = 3.75 kW)
40 mm plexiglass

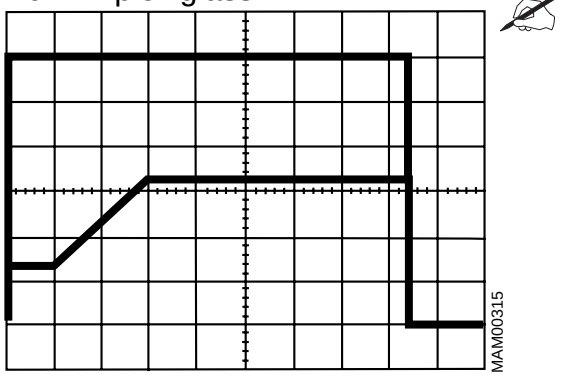

Fig. 11

30 kV	1 V/T (1 T <=> 5 kV)
125 mA	1 V/T (1 T <=> 40 mA)
*)	100 ms/T

30 kV Iontomat (P = 4.7 kW)
40 mm plexiglass

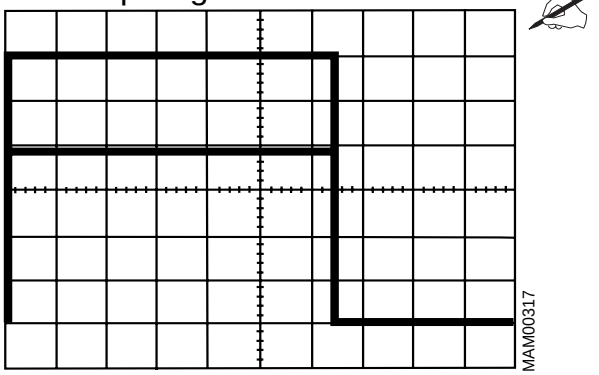

Fig. 12

30 kV	1 V/T (1 T <=> 5 kV)
158 mA	1 V/T (1 T <=> 40 mA)
*)	100 ms/T)

30 kV Iontomat (P = 3.75 kW)
40 mm plexiglass

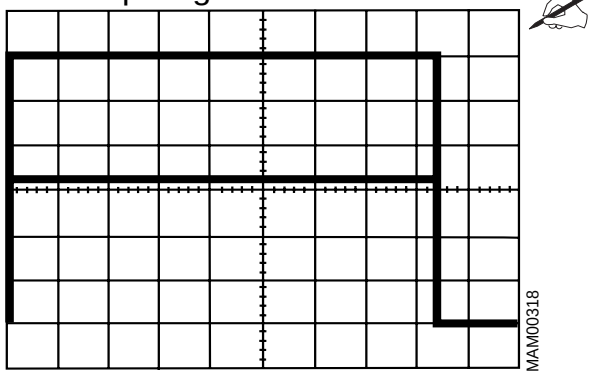

Fig. 13

30 kV	1 V/T (1 T <=> 5 kV)
125 mA	1 V/T (1 T <=> 40 A)
*)	100 ms/T

*) total exposure time dependent on programmed sensitivity

Checking and programming with the service PC

Use the service PC to check and program the IONTOMAT.
Operation of the service PC is described in Chapter 20 "Appendix".
The tables in this kit are optimized for the following four film/screen combinations.

Table 1

Film	Screen	Cassette	Sensi-tivity	Correction curve
Kodak Min-RE	Kodak Min-R	Kodak Min-R2	11	A
Fuji UM-MA HC	Fuji HR Mammo Fine	Fuji EC-MA	9.5	B
Agfa Mamoray MR6	Agfa MR Detail S	Agfa MR Detail S	7	C
Dupont Microvision C	Dupont Quantavision ME	Dupont Quantavision	12	D

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Program the IONTOMAT values as follows:

NOTICE

If it is a M 3000 stand equipped with one "wing" only and counter-weight, the programming for "wing 2" shall be omitted. If it is a M 1000 stand, the programming is done for "base plate".

Sensitivity

Start with the sensitivity listed in the table for the film/screen combination used by the customer. Program this values for "wing 1" and "wing 2" under H. If the customer uses one more film/screen combination, program this value for "wing 1" and "wing 2" under D, otherwise program the same values as under H.

If the film/screen combination used by the customer is not listed in table 1, start with sensitivity 11.

NOTICE

Be sure to use the same type of cassette, screen and film in each object table as the customer uses.

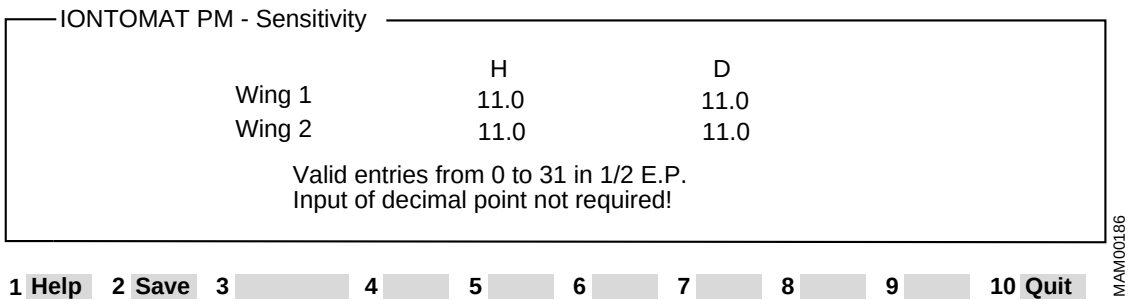

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Fig. 1

Values from 0 to 31 can be entered.

Sensitivity correction

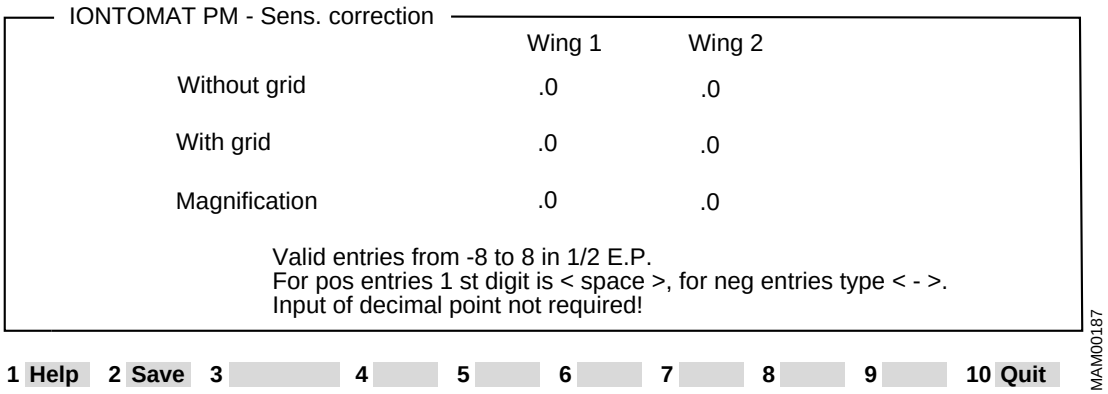

Fig. 2

Indicates the sensitivity correction for different types of object tables. The position "without grid" applies to Stereotactic Biopsy Attachment as well.

Factory set to "0", "0", "0".

Different film-density corrections can be programmed for the different tables with the "Sens-cor" module.

Correction curve

Program "Correction curve" according to table 1 above (see also M3000 Service Instructions).

If the customer uses another combination or a mixture of those listed in table 1, please refer to page 11 - 3.

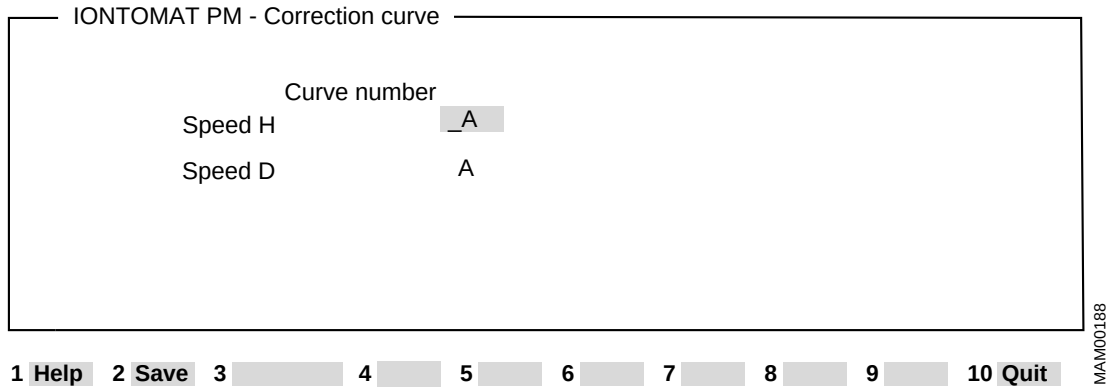

Fig. 3

Values shown as delivered.

Other film/screen combinations

In case the customer uses another film/screen combination than those the correction curves are optimized for, see table 1 of correction curves on page 11 - 1, proceed as follows:

1. Begin with curve C, speed H, and make test exposures using a grid table at 25 kV (Mo/Mo), 2 and 6 cm plexi (5 cm if limit (ER550) or ER 013 occurs, due to insufficient dose rate). If the image from 6 cm plexi (O.D.-6 cm) is lighter than one from 2 cm plexi (O.D.-2 cm), choose correction curve A or B (A makes images from thick objects darker than B does, i.e. A corrects more than B). On the other hand, if O.D.-6 cm is darker than O.D.-2 cm, choose curve D. Repeat the test with the chosen curve. The difference between O.D.-6 cm and O.D.-2 cm (Δ O.D.) should be less than 0.30 O.D.
2. Now test 27 kV, 2 and 6 cm. Try even 30 and 35 kV if these kV´s are of interest for the customer. If this Δ O.D. is $\leq$ 0.30 O.D., go to 3. If not, it is necessary to test another curve (choose between A, B, C and D) at 27 kV. Choose the best one and repeat the test at 25 kV. Continue in this manner until the result is as good as possible for the kV´s of interest for the customer. Diagrams 1, 3, 5 and 7 on the following pages can be of help. Note that the steeper the curve is, the more the thicker objects are corrected (they will be darker).
3. Check also the correction with 2 cm plexi between the different kV values of interest. If this Δ O.D. is $\leq$ 0.30 O.D., an acceptable curve has been chosen. It may not be possible to reach the specified O.D. corrections, choose then the best compromise for the customer´s needs.
4. Do the same tests with magnification table, but use 2 and 5 cm plexi instead. The permissible Δ O.D. for magnification tables is $\leq$ 0.40 O.D. If the result is not satisfactory, try another curve with speed button D. Choose between correction curves A, B, C and D. Diagrams 2, 4, 6, and 8 on the following pages can be of help. Normally, the magnification tables and the contact exposures tables function properly with the same curve family, which means that the other speed button can be used for another film/screen combination.
5. Test the chosen curve/curves with the other anode/filter combinations as well.

NOTICE **The film density levels may vary from cassette to cassette. Therefore, be sure to use one and the same cassette for all test exposures.**

Correction curve diagrams

The following diagrams approximately show the families of correction curves. The axes "Quotient" and "Transparency correction" are the values shown in "Normal mode, Iontomat data" with the service program.

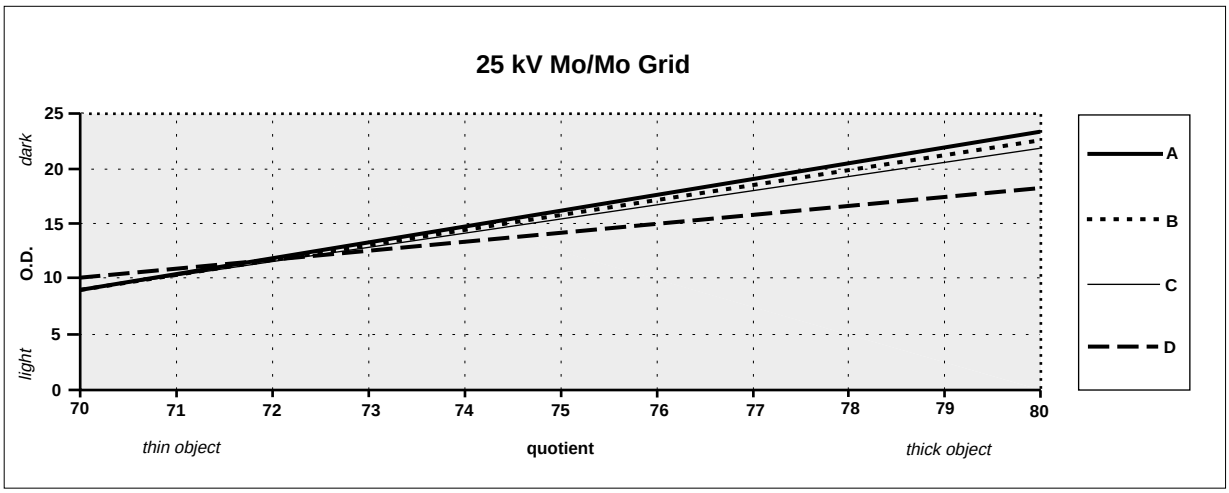

Diagram 1

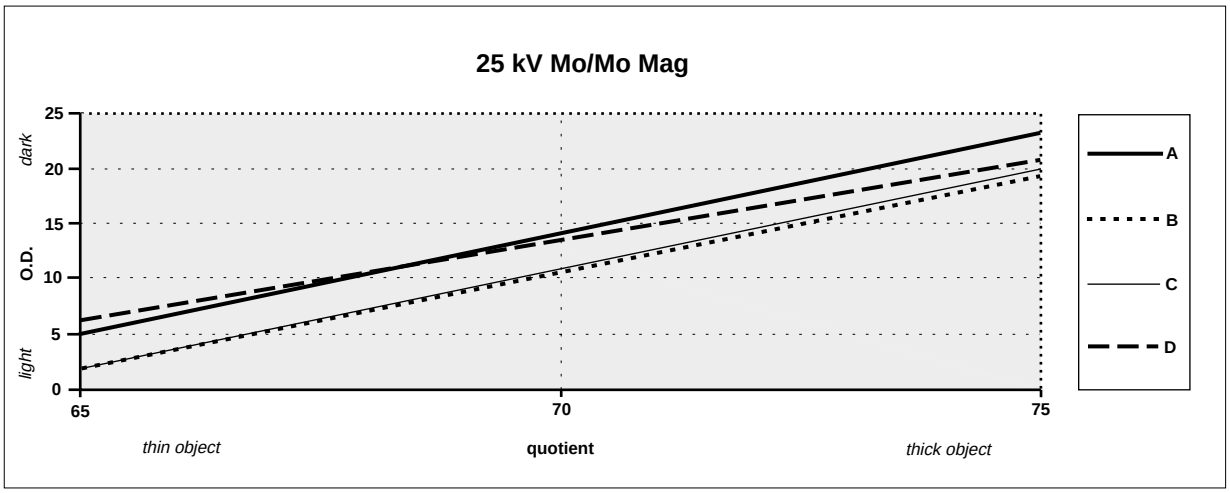

Diagram 2

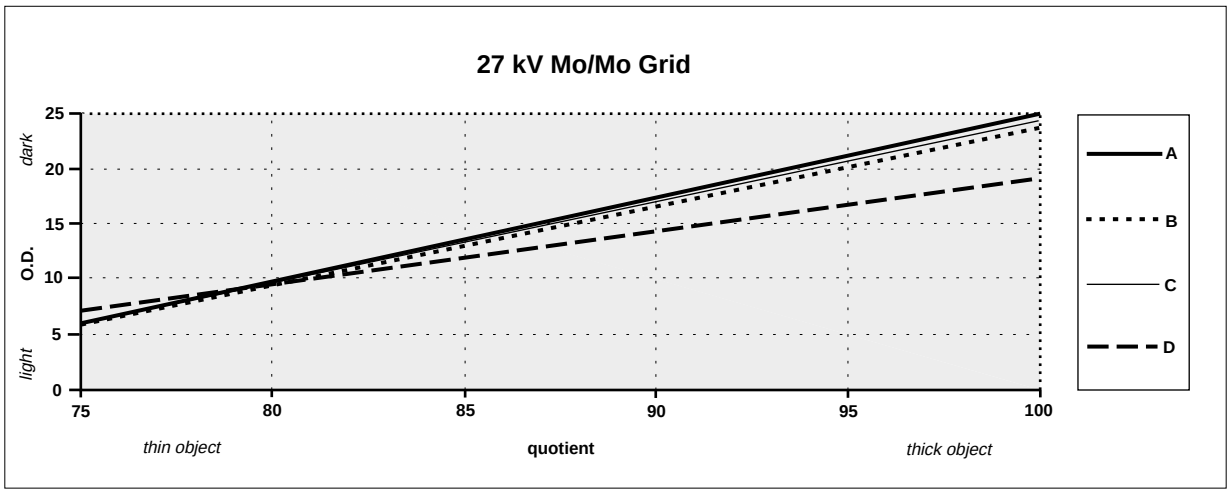

Diagram 3

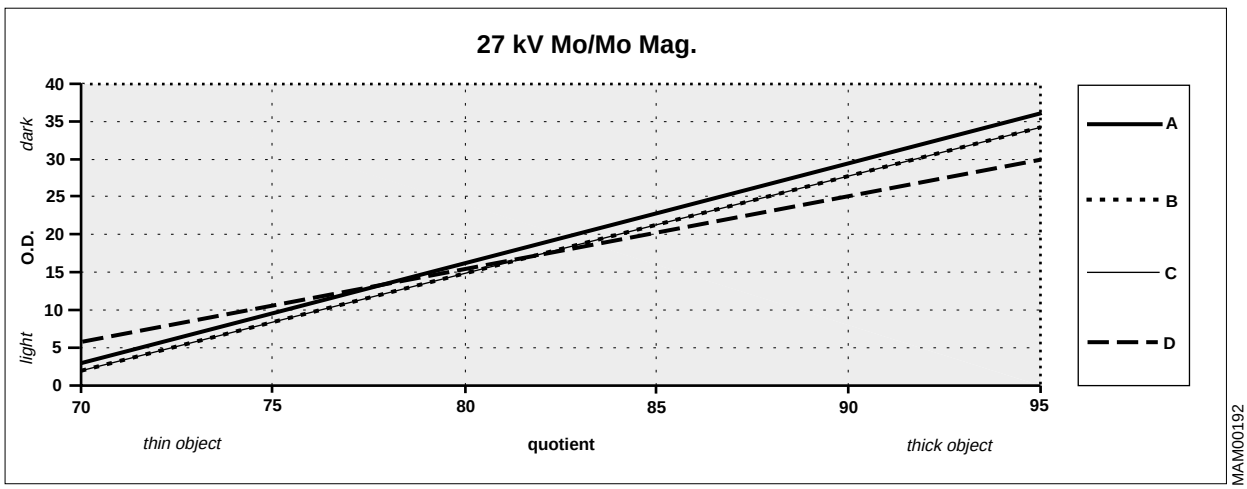

Diagram 4

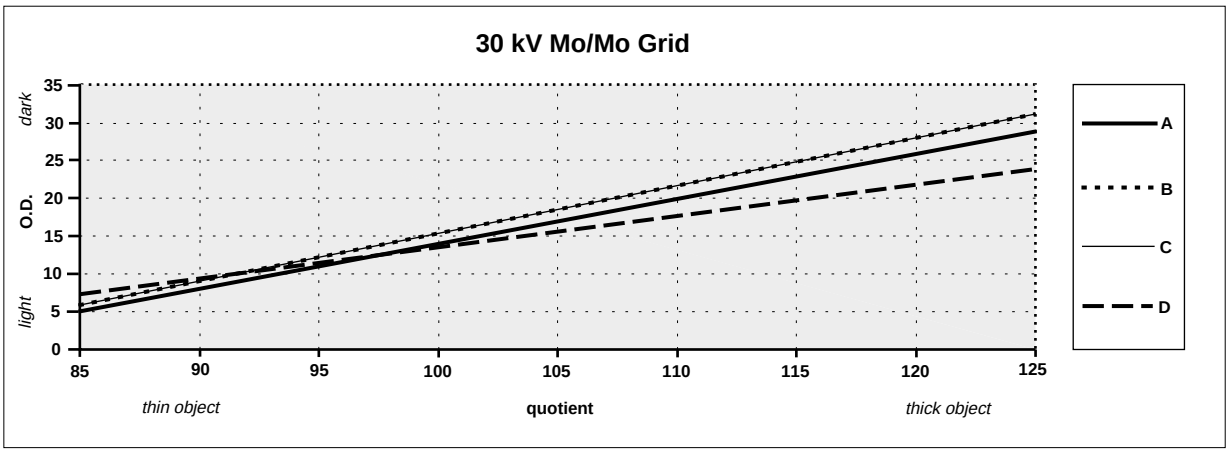

Diagram 5

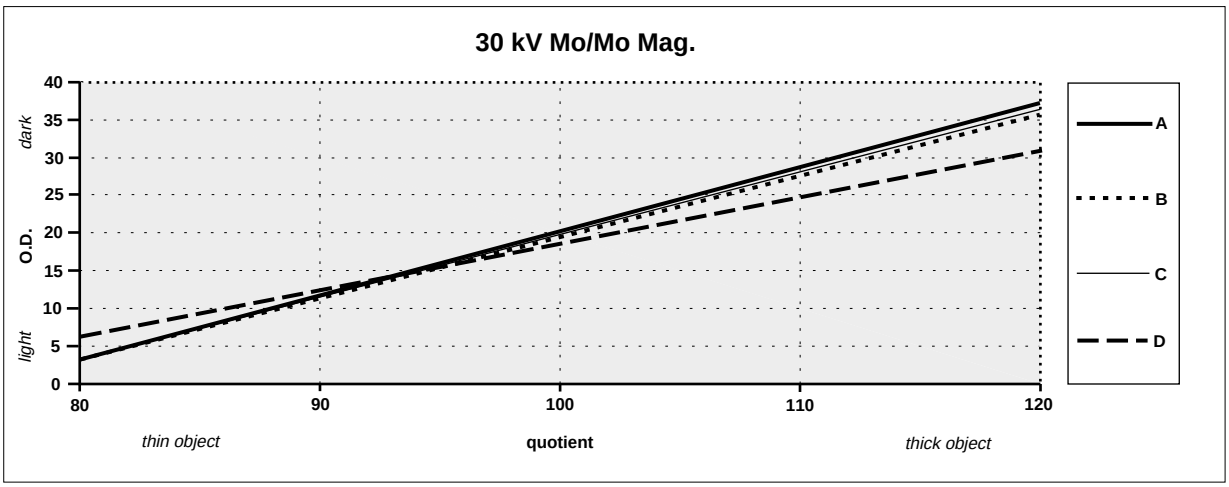

Diagram 6

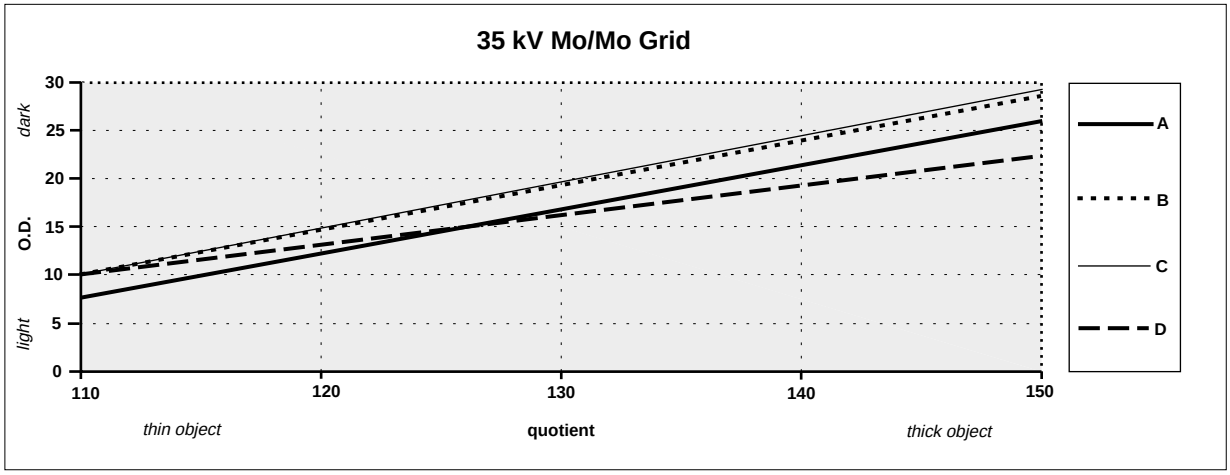

Diagram 7

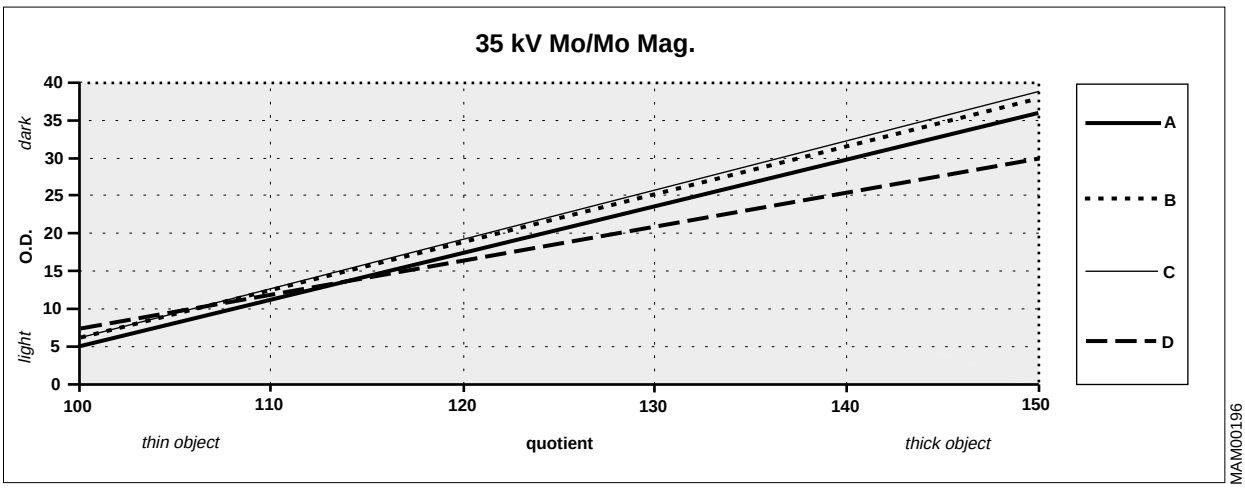

Diagram 8

Checking the film density

The sensitivity to be programmed must be determined by means of test exposures with anode/filter combination Mo/Mo at 25 kV, or kV preferred by the customer, and 20 mm plexiglass.

The plexi must extend at least 30 mm behind the rear edge of the detector marking on the compression plate and 10 mm beyond the chest wall edge of the table.

The detector shall be nearest the chest wall.

When making test exposures, ensure correct positioning of the plexiglass plates.

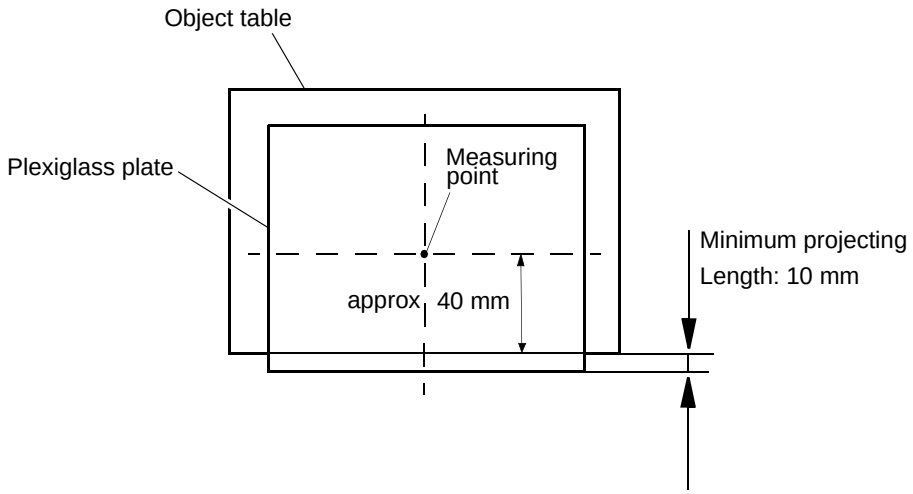

Fig. 4

NOTICE **Detector nearest chest wall. Place the plexi plates in the same position for all exposures and measure the density as shown above on the emulsion side of the film.**

Start with the sensitivity listed in table 1 and adjust a density of approx 1.5 ("Sensitivity H"). Repeat this procedure on the other "wing" (base plate).

Change to the other film/screen combination, if used, and program "Sensitivity D" for the density as above. Repeat this procedure on the other "wing" (base plate).

The final values are dependent on the type of cassette used and desired optical density.

Checking the automatic transparency adaption

Check the automatic transparency adaption with a grid table with 20, 40 and 60 mm plexi at the voltage(s) preferred by the customer (within 25-35 kV) and all anode/filter combinations. If the dose rate is too low (error 013 or "Limit"), use 50 mm plexi instead of 60 mm.

Tolerance:

≤ 0.3 density difference at constant voltage and thickness 20-60 mm.

≤ 0.3 at constant thickness and 25-35 kV.

NOTICE	**Tolerance valid for grid tables and film/screen combination according to table 1.**

These limits apply for film with max. gamma 4.0 measured at the density chosen.

NOTICE	**The film density levels may vary from cassette to cassette. Therefore, be sure to use one and the same cassette for all test exposures.**

Checking the automatic transparency adaption and OPDOSE (MAMMOMAT 3000 only)

The unit factory-set with the following values, which are to be regarded as recommendation. Changes can be done with the service PC program (**Configuration, Miscellaneous, Auto limits)**.

Thickness	kV	Anode/filter combination
Th ≥ 60 mm	26	W / Rh
60 > Th ≥ 45 mm	27	Mo / Rh
45 > Th ≥ 30 mm	27	Mo / Mo
30 mm > Th	26	Mo / Mo

Fig. 5 Installations with filter disc Mo 0.030 / Rh 0.025 /Rh 0.050

Thickness	kV	Anode/filter combination
Th ≥ 60 mm	28	Mo / Rh
60 > Th ≥ 45 mm	27	Mo / Rh
45 > Th ≥ 30 mm	27	Mo / Mo
30 mm > Th	26	Mo / Mo

Fig. 6 Installations with filter disc Mo 0.030 / Rh 0.025

When making test exposures, follow the instructions on page 11 - 8 for positioning the plexiglass plates and measuring the density.

NOTICE **Both "wings" must be checked, if the stand is equipped with pivoting object-table arm (Bucky selector).**

Start with 60 mm plexi and compress. Make sure that the display indicates at least 60 mm. Make an exposure and measure the optical density. Repeat this procedure with 50 mm, 40 mm and 20 mm plexi.

Change density with the density setting buttons on the control panel as needed (the panel programming switch must be ON, see Service PC program **Configuration, Miscellaneous, Panel programming**). The optical density for the four different programs shall be as near as possible to 1.5 O.D. (or the density preferred by the customer). Store with the memory button.

Checking cut-off dose and resolution (§16 Germany)

This test is only required in the Federal Republic of Germany in the area of application of the X-ray decree. The result must be entered in the acceptance test certificate supplied. Both tables must be checked.
Ascertain the cut-off dose (K_B) and resolution (R_g) with the NORMI 7 test body

Test arrangement (front view)

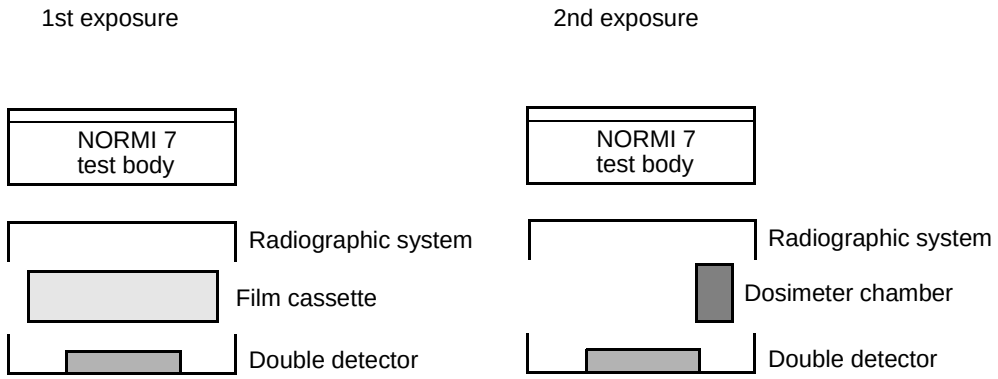

Fig. 7

Procedure:

1. Select 30 kV and AEC (Iontomat) on the control panel.
2. Place the NORMI 7 test body on the object table flush with the chest wall side.
3. Slide film cassette into the object table.
4. Trigger the first exposure.
5. Note the mAs reading ($Q_{G(1)}$) shown on the control panel.
6. Develop the film. Measure the resolution (R_g) and the density (D) and enter in the form.
7. Position the dosimeter chamber in the cassette slot.
8. Select 250 mAs on the control panel.
9. Trigger second exposure.
10. Record the dose value ($K_{B(2)}$) measured as well as the associated mAs reading ($Q_{G(2)}$)
11. Calculate and record the cut-off dose as follows:

$$K_B = K_{B(2)} \cdot \frac{Q_{G(1)}}{Q_{g(2)}}$$

Output values of constancy testing (§16 Germany)

Determine the output values of the constancy testing at approx. 30 kV with the customer´s own constancy test body (NORMI 7 test body etc.) and enter them in the form stapled to the acceptance test certificate. Both tables must be checked

Test arrangement

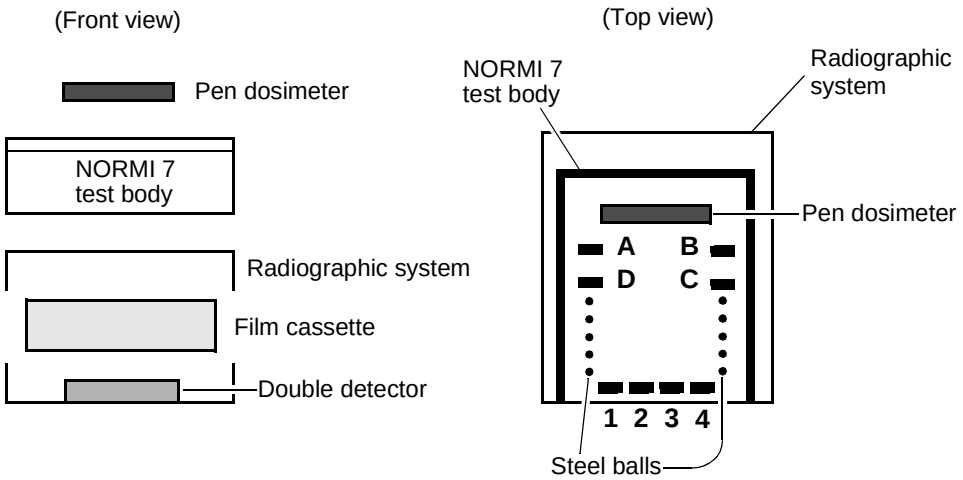

Fig. 8

Plexiglass steps:	Woven steel wire:
1 = 40 mm	A = 100 µm
2 = 43 mm	B = 80 µm
3 = 49 mm	C = 63 µm
4 = 46 mm	D = 40 µm

Procedure:

1. On the control panel, select a value of approx. 30 kV and AEC.
2. Place the test body on the object table flush with the chest wall side.
3. Slide film cassette into the object table.
4. Trigger the exposure and develop the film.
5. Measure the resolution (A-D), density (1-4) and the over-radiation on the chest wall side and enter in the form (steel balls).
6. Read off the pen dosimeter and record the dose value.

Setting the real time clock

Prerequisite

The correct date and time must be set in the service PC. If not set date at C:\> by typing **date <**ENTER**>** and time at C:\> by typing **time <**ENTER**>.**

Setting the time in the Mammomat

Main menu:

1. Select **Configuration** <↑> <↓> < ENTER>.
2. Select **Clock** <↑> <↓> < ENTER>.
3. Press <F2>.
   With <F2> the date and time set in the service PC are taken over by the Mammomat.

Setting the tube-current reduction

In Mammomat, the tube-current reduction is factory-set to "ON", which means that the tube current is reduced to approx. 50 mA during the first 100 ms of the exposure. In this way, possible grid lines are avoided.

If the tube-current reduction is set to "OFF", grid lines may occur at short exposure times (< 100 ms).

NOTE	**The tube-current reduction is effective only in Iontomat mode.**

Main menu:

1. Select **Configuration** <↑> <↓> < ENTER>.
2. Select **Miscellaneous** <↑> <↓> < ENTER>.
3. Select **Tube mA red.** <↑> <↓> < ENTER>.
   Tube-current reduction (TCR) at short exposure times.
   TCR switch is ON/OFF.
   Exposure time with 50 mA tube current is 100 ms.
4. Switch **ON** or **OFF** with <↓>.
5. Save the programmed values with <F2>.

Reducing the generator power

To achieve full power, the measured resistance must not exceed the following values:

- 0.25 Ω at 110 V (1-phase)
- 0.45 Ω at 208 V
- 0.50 Ω at 230 V
- 0.60 Ω at 240 V
- 0.65 Ω at 277 V
- 0.85 Ω at 400 V (2-phase)

If the above values are exceeded, reduce the generator power as follows:

Main menu:

1. Select **Configuration** <↑> <↓> < ENTER>.
2. Select **Miscellaneous** <↑> <↓> < ENTER>.
3. Select **Red. of power** <↑> <↓> < ENTER>.
   Reduction of power depending on line quality.
   Tube is P 40 MoW.
4. Select nominal line voltage ____ V with cursor keys <↑> <↓> and < ENTER>.
5. Type in line impedance ____ Ω. Enter the measured line impedance.
   Calculated power is ___ kW. Max. possible tube power is displayed.
6. Save the programmed values with <F2>.

Rotary motion

1. System "OFF".
   The rotary motion and the vertical adjustment of the swivel-arm system shall be blocked.

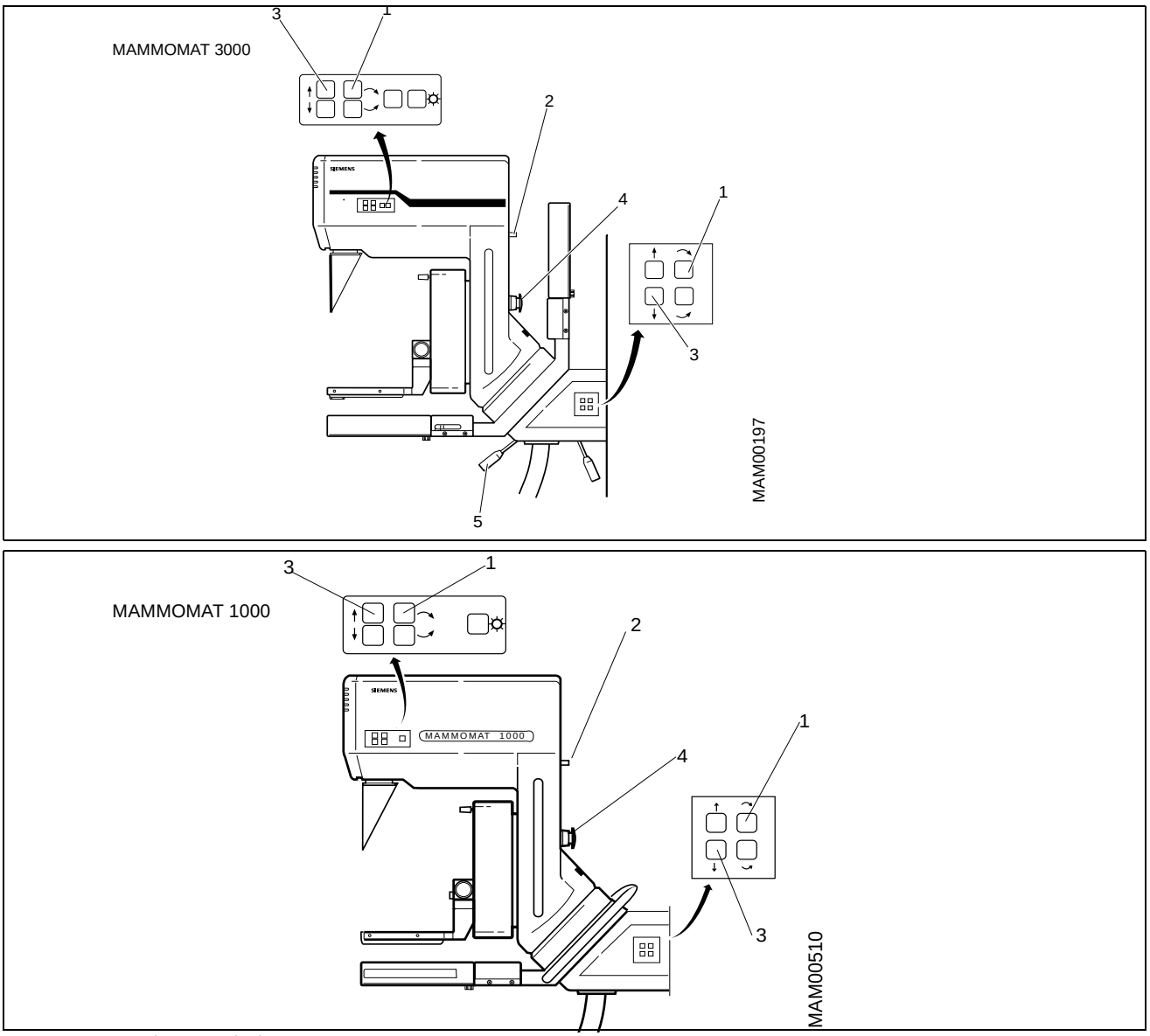

Fig. 1 Swivel-arm system

2. System "ON", object table installed and projection angle set to minimum with presetting knob (2/Fig. 1).
3. Check the rotary motion of the swivel-arm system by pressing buttons (1/Fig. 1) one by one.
   The rotation of the swivel-arm system shall stop when the button is released or when end position is reached (+135 degrees clockwise and -180 degrees counterclockwise). The projection angle is shown on the display at the lower part of the stand.

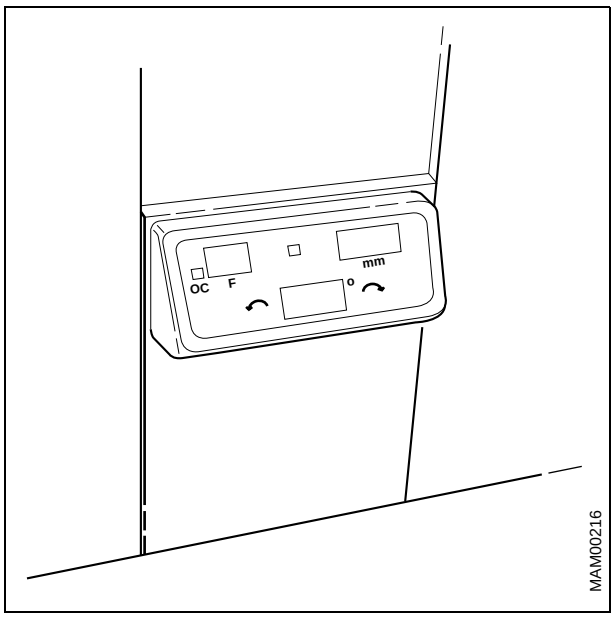

Fig. 2 Display at the lower part of the stand

4. Set the projection angle to 60 degrees with presetting knob (2/Fig. 1).
   The preset angle is displayed for approx 3 s.

5. Press one of the buttons (1/Fig. 1).
   The rotary motion of the swivel-arm system shall stop automatically when the preset projection angle (both + and -) is reached and at 0 degrees.

NOTICE **All eight rotary motion buttons (four on either side) must be checked. After the button has been released, the swivel-arm system shall remain in the position set.**

Vertical adjustment

CAUTION **Before vertical adjustment of the swivel-arm system is performed, be sure to remove the protective strips from the metal curtain, see page 3 - 5.**

1. Press the buttons for upward and downward movement (3/Fig. 1) of the swivel-arm system.
   The movement shall stop automatically when either end position is reached or when the button is released.

NOTICE **All eight vertical adjustment buttons (four on either side) must be checked. The switching off in upper and lower end position is effected by switches S881 and S884 respectively.**

Emergency stop

1. Press the emergency stop button (4/Fig. 1).
   The button shall latch and all motorized movements of the equipment shall be blocked ("Er 824" shall appear). To reset the emergency-stop button, turn it clockwise.

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Checking and adjusting the field light time

Checking the field light time

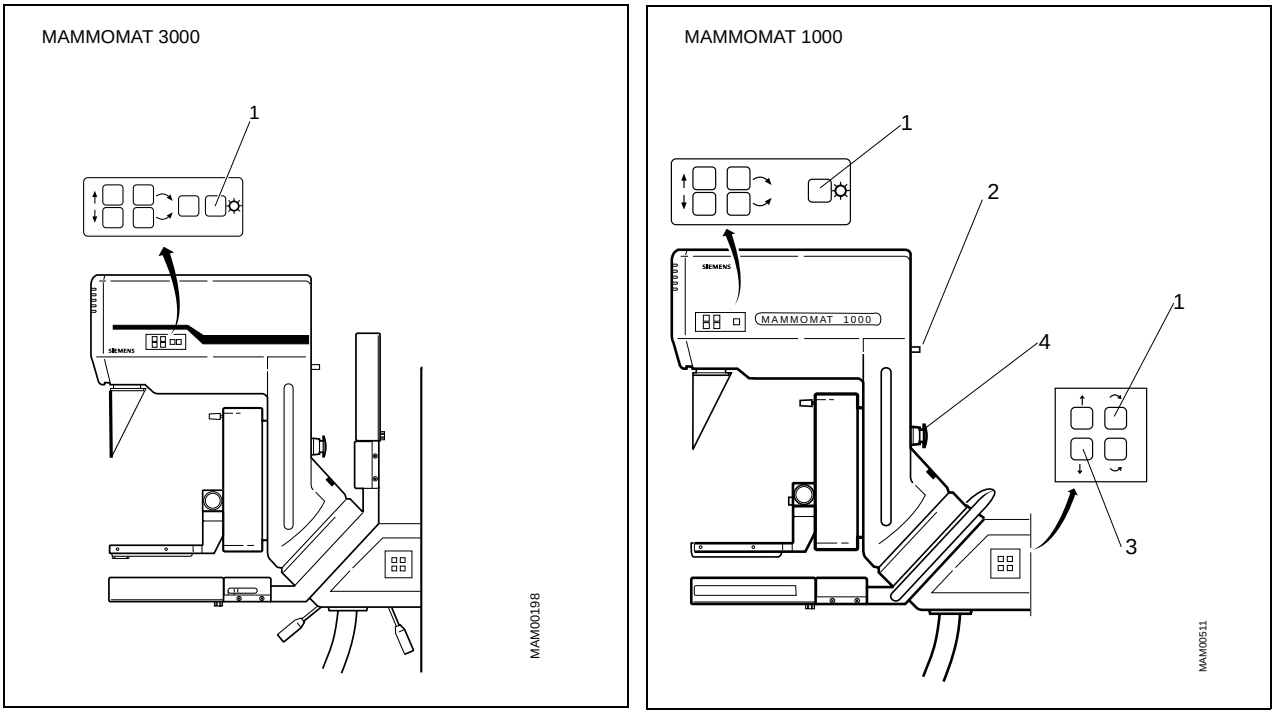

Fig. 1 Field-light switch

1. Switch on the field light by pressing switch (1/Fig. 1) or by pressing the compression foot switch (2/Fig. 2).
   The field light shall go out automatically after a preset period of time (normally 20 s.).

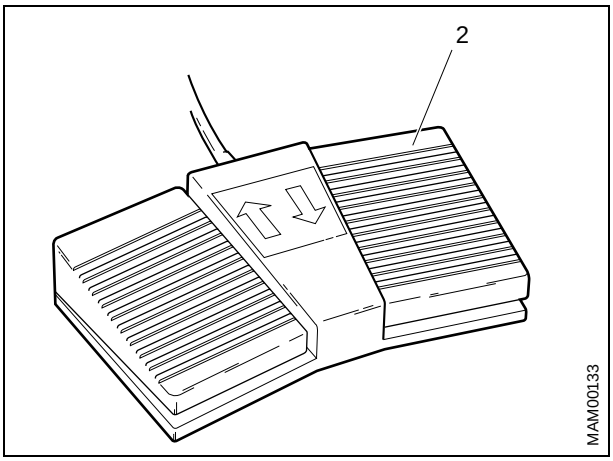

Fig. 2 Foot switch

Adjusting the field light time

The illumination time of the light field can be adjusted according to the customer´s desire within a certain range.

NOTE	**Shorter illumination time means increased life time of the lamp.**

1. Connect the service PC to the generator and start the program as described in Chapter 20 "Appendix".
2. Program according to the following:

Main menu:

1. Select **Configuration** <↑> <↓> < ENTER>.
2. Select **Miscellaneous** <↑> <↓> <ENTER>.
3. Select **Illumination time** <↑> <↓> <ENTER>.
4. Type in illumination time and save with < F2>.

Checking the compression device

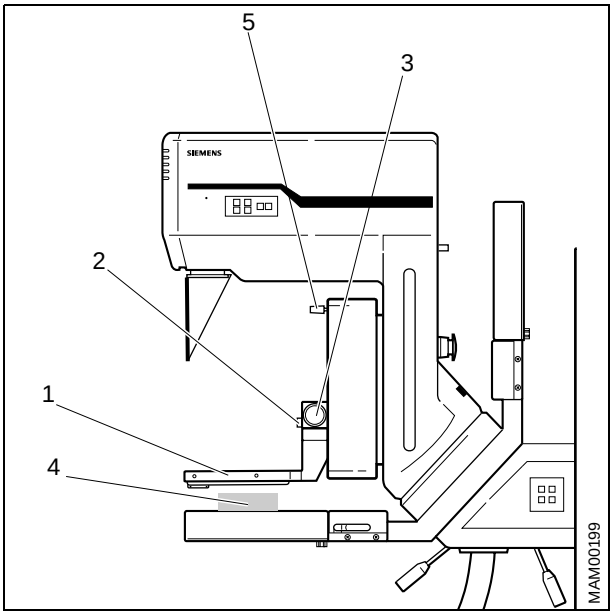

Fig. 1 Swivel-arm system

1. Attach compression plate (1/Fig. 1) if not already done.
2. Check that the compression plate cannot be removed without pressing the compression plate release button (2/Fig. 1).
3. Check the function of the knobs for manual compression/decompression (3/Fig. 1).
4. Place a piece of soft material on the object table, for example a rolled up towel or a piece of foam-rubber (4/Fig. 1).
5. Check the function of the foot switch for motorized compression/decompression (1) and (2) in (Fig. 2).

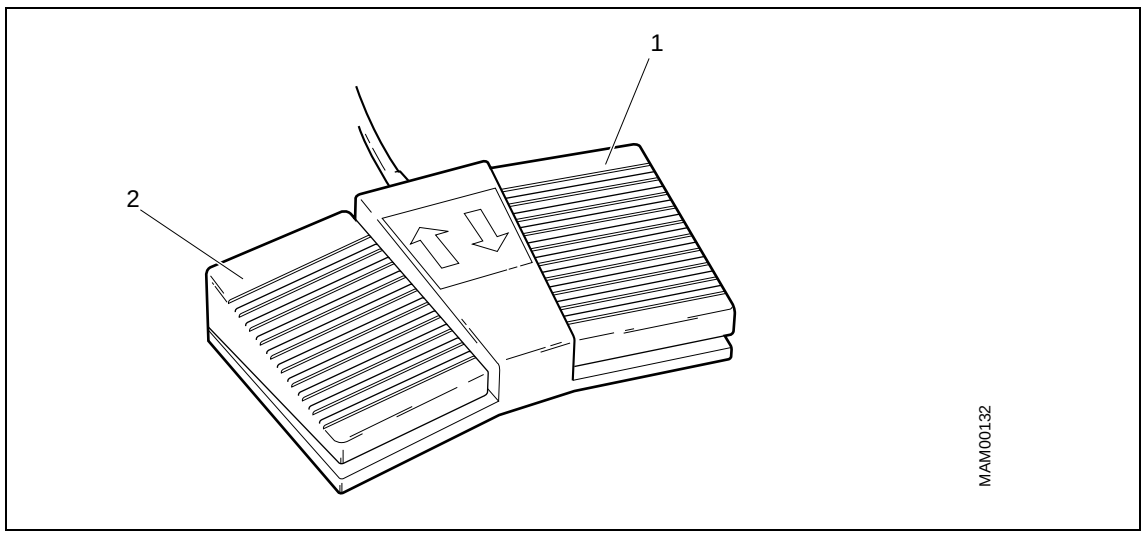

Fig. 2 Foot switch

6. Press the foot switch for motorized decompression to move the compression plate upwards while at the same time pressing the compression plate in the opposite direction by hand.
   The upward movement of the compression plate shall now stop (safety switch).
7. Set the compression to 7 kg by using the presetting knob (5/Fig. 1).
   The preset compression force appears on the display at the lower part of the stand (1/Fig. 3).

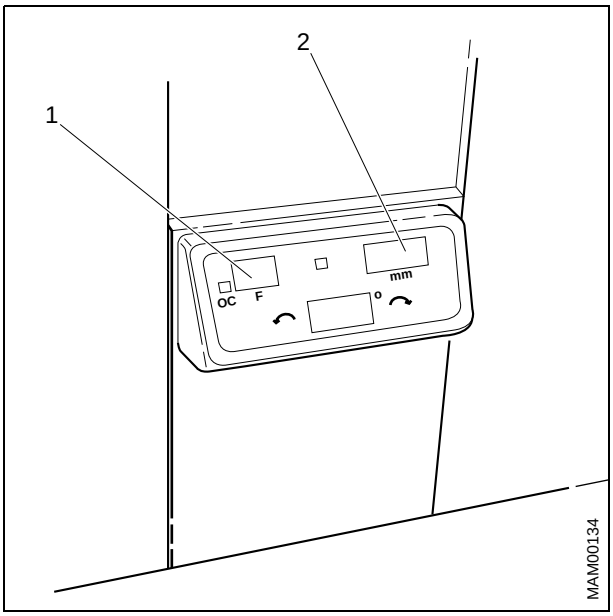

Fig. 3 Display at the lower part of the stand

8. Press the foot switch for motorized compression to move the compression plate downwards while simultaneously pressing the compression plate in the opposite direction by hand.
   The compression plate shall now slow down and stop, when the preset compression force is reached.

NOTICE **During compression, the motorized vertical adjustment as well as the rotary motion of the swivel-arm system shall be blocked.**

Decompression button (only with separate control console)

Check the decompression button on the separate control console for proper function, i.e. that the compression plate moves upwards when the button is pressed.

Checking the OPCOMP

1. Decompress.
2. Set the compression force to 20 kg by using the presetting knob (5/Fig. 1) and compress.
   The compression movement must be interrupted by OPCOMP before 20 kg is reached, i.e. at 5-15 kg depending on the material (4/Fig. 1) used.

Adapting OPCOMP

If the factory-set OPCOMP is not to the customer's satisfaction, an adjustment can be done with the tautness factors in the "Best compression table", see Service Instructions. A lower tautness value will increase the compression force and vice versa.

- Increase/decrease the tautness factor by e.g. 10 the first time. Let the customer use this setting for at least two weeks, before further changes are made.

NOTICE

Opcomp has been thoroughly tested by Siemens. If any factors are changed, OPCOMP will no longer be an optimization of compression force and image quality according to Siemens' clinical test.

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Checking the exposure blocking

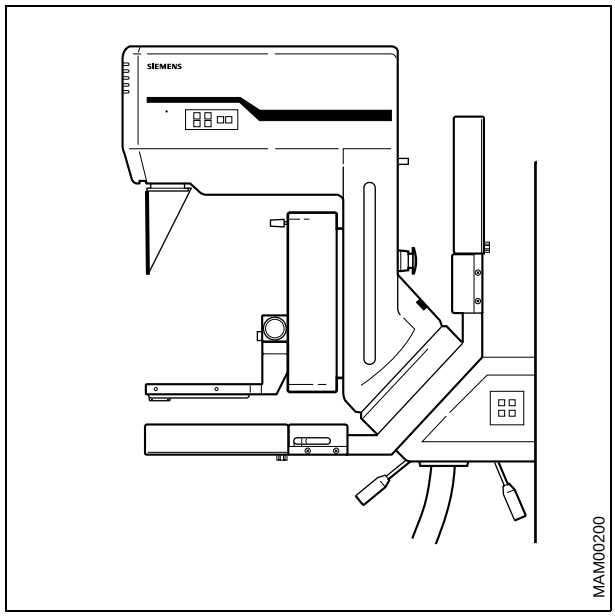

Fig. 1 Swivel-arm system

Check that the exposure release is blocked during the following conditions:

- No film cassette inserted.
- No object table installed.

NOTICE

The "casette loaded" switch must be set to "ON" with the service PC program: Configuration - Miscellaneous - Cassette loaded check.

NOTICE

The film cassette must be exchanged after each exposure. A second exposure before exchanging the casette is not possible (exposure release is blocked).

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General

The nominal width of the radiation field is 248 mm (18×24 mode) and 308 mm (24×30 mode). The nominal depth of the radiation field is 191 mm (18x24 mode) and 243 mm (24x30 mode), adjusted so that there will be no white edge on the film.

- On the chest wall side, the radiation field must extend beyond the film edge but not more than 9 mm. That applies for both the 18x24 and the 24x30 mode.
- On the sides, the radiation field must not extend outside the object table and not extend more than 13 mm outside the film.
- on the nipple side, the radiation field must not extend beyond the film edge by more than 13 mm.

Left edge:	±6.5 mm
Right edge:	±6.5 mm
Back edge:	±6.5 mm
Front edge:	±6.5 mm

Measuring procedure

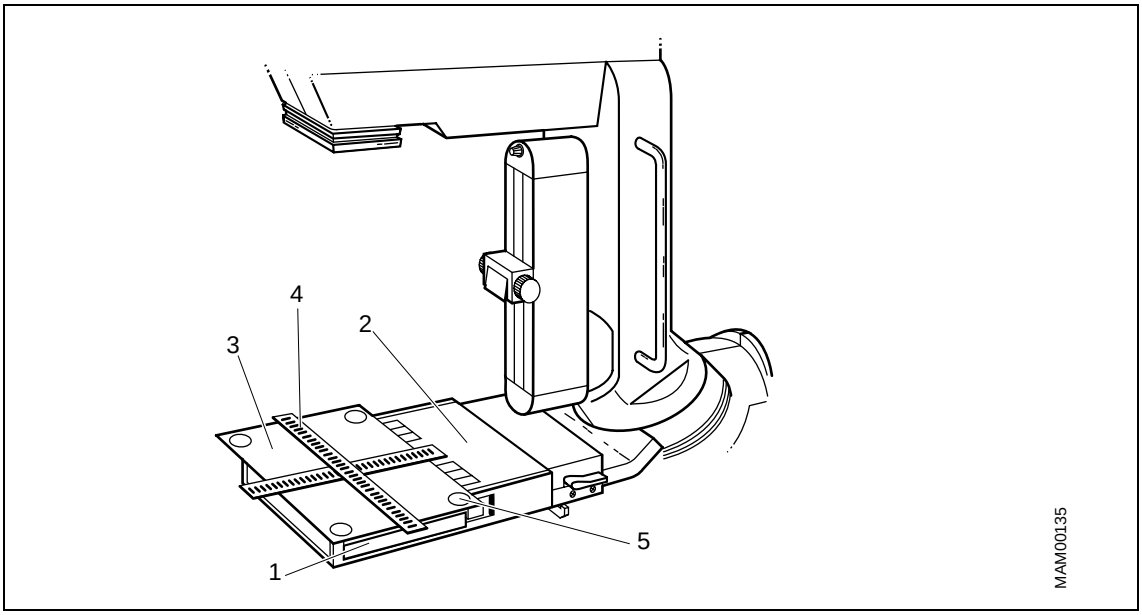

Fig. 1 Checking the radiation field

1. Put film into the cassette (1/Fig. 1). The film shall be centred in the cassette.
2. Insert the cassette into the object table (2/Fig. 1).
3. Place the film bag (3/Fig. 1) on the object table. The film bag must extend beyond the chest wall edge by minimum 10 mm.
   If no corresponding film bag is available, you can place two film cassettes side by side on the object table.
4. Place a centering cross (4/Fig. 1) on the film bag or cassettes.
5. Switch on the light field and mark the edges of the light field with four coins (5/Fig. 1).
6. Write down the values of the centering cross corresponding to the side edges and the front edge of the object table.
7. Release exposure (Mo/Mo).
8. Develop exposed films.

Evaluation

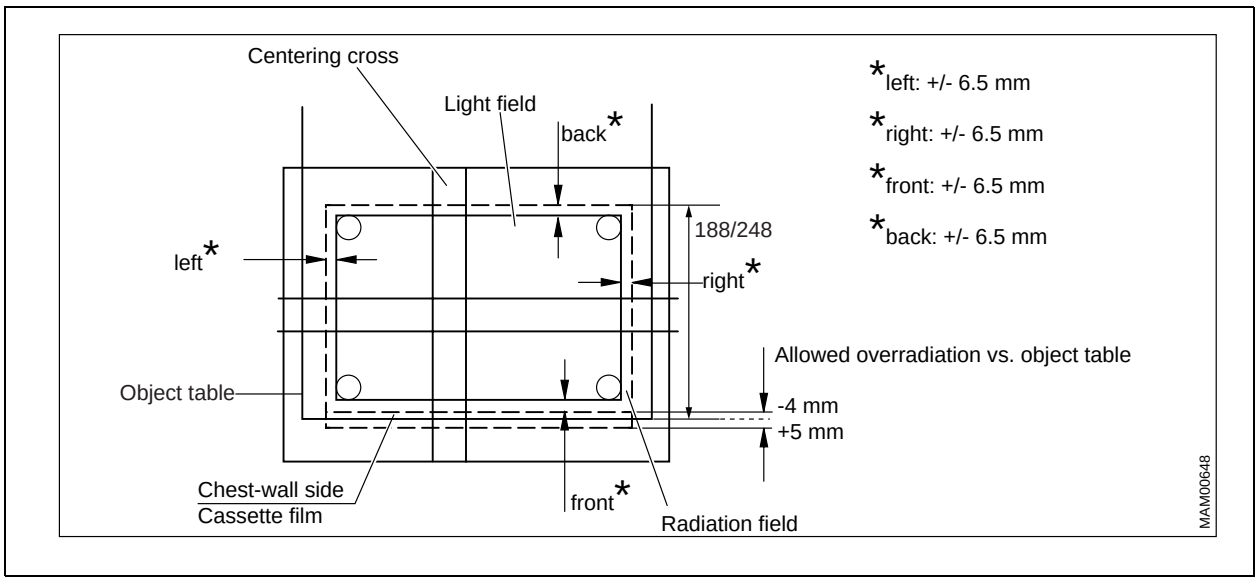

Fig. 2 Field limitation

NOTICE **Values for evaluation are defined in the plane of the film bag.**

Alignment radiation field/light field

1. On the film that was placed in the film bag, mark the light field limit with guidance of the coin marks as shown in (Fig. 2) above.
   The maximum divergence between radiation field and light field of 6.5 mm must not be exceeded on any side.

Radiation field limitation

1. Measured from the chest wall side of the object table, the radiation field must be within -4 and +5 on the chest wall side and must not exceed 188 mm (18x24 film) and 248 mm (24x30 film) on the nipple side.
2. The radiation field must under no circumstances extend beyond the side edges of the object table. The margins to the edges must at least be 7 mm. Compare the side values read off on film-bag film with the corresponding values written down in point 6 above.

Correction, see Service Instructions.

3. Finally check the radiation field on a film exposed inside the object table.
   18x24 film must be completely exposed on all sides. 24x30 film might have up to 3 mm white edge on the nipple side[1]. The other sides must be completely exposed

Repeat this check with all object tables and both "wings" (base plates).

1. adjust within the given tolerance in point 1 above if necessary

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Service PC and measuring instruments

Recording the programmed values

Save the programmed values at menu command "SAve config.file".

Main menu:

1. Select **Configuration** <↑> <↓> < ENTER>.
2. Select **Save config.file** <↑> <↓> < ENTER>.
3. Press <F2>.

   Save data with <F2>.

NOTICE	**No write protection on the diskette! (Only if started from diskette).**

Reading the exposure counter and deleting the error memory

Read the exposure counter and delete the error memory after putting the stand into service.

A/ Reading the exposure counter

Main menu:

1. Select **Service** <↑> <↓> < ENTER>.
2. Select **Show exposure counter** <↑> <↓> < ENTER>.
3. Enter the current counter reading in the certificate.

B/ Deleting the error memory

Main menu:

1. Select **Service** <↑> <↓> < ENTER>.
2. Select **Delete error buffer** <↑> <↓> < ENTER>.
3. Delete the error memory with <Y>.

Saving the configuration file

Main menu:

1. Select **Backup** <↑> <↓> < ENTER>.
2. Select **Copy installation area to floppy** <↑> <↓> < ENTER>.
3. Select **All** <↑> <↓> < ENTER>.
4. Leave the program with <F10>.

Removing the measuring instruments

1. Turn OFF the generator.
2. Remove the service PC.
3. Remove connected measuring instruments.

Checking the protective grounding resistance

Using the protective ground-wire tester, measure the resistance between the protective ground terminal in the stand (X899, see Chapter 5 "Cable connections") and all metallic parts of the equipment which the patient/operator may come in contact with, incl. all object tables. The protective ground resistance must not exceed 0.1 Ω.

Mounting the cable duct covers

If not already done, mount the cable duct covers, see Chapter 4 "Installing the generator and the stand".

Mounting the stand covers

The Mammomat stand covers exist in two versions, one with separate rear side covers and one with a single rear cover that also covers the rear sides.

⚠WARNING

When mounting the stand covers, make sure that the screws at the top of the stand are securely tightened and have functioning contact washers. These screws are used to establish protective ground connections. Before mounting the front covers, be sure to remove the protective strips from the metal curtain (2). Store the strips in the holders provided on both sides of the curtain.

Mammomat stand with separate rear side covers.

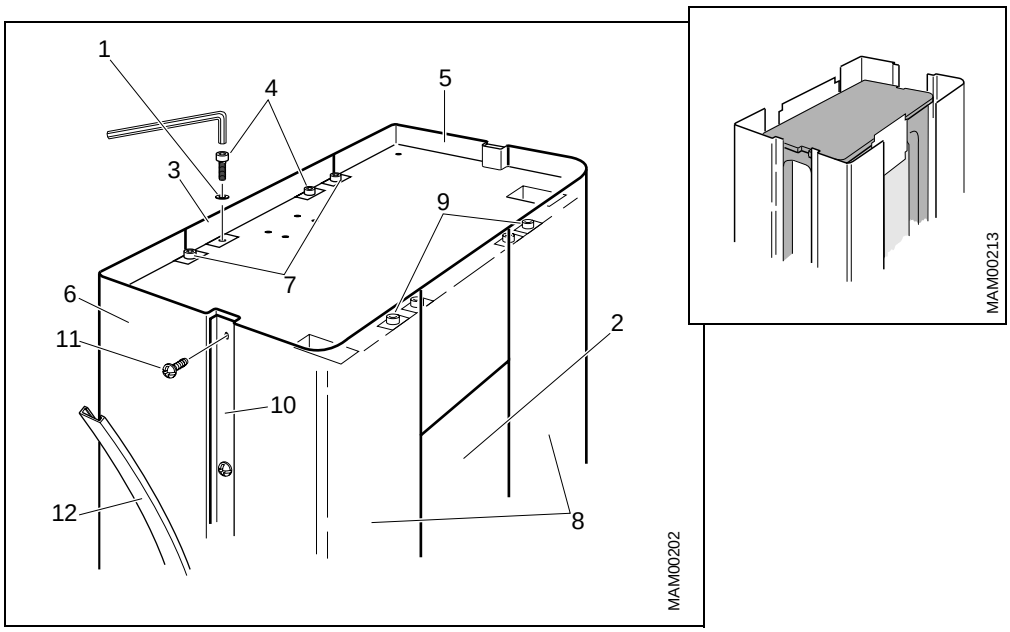

Fig. 1 Mounting the stand covers on a stand with separate rear side covers.

1. Fit the rear cover (3) to the stand and fasten it with screws (4) and contact washers (1).
   Be careful not to damage the cables at the cable outlet!
2. Fit left and right front covers (8) to the stand and fasten with screws and contact washers (9).
3. Fit left and right rear side covers (5) (6) to the stand and fasten with screws and contact washers (7).
4. Fit inner plastic strip (10) to the front and side covers and fasten with screws (11), eight on either side.
5. Press on the outer plastic strip (12).

Mammomat stand with single rear cover.

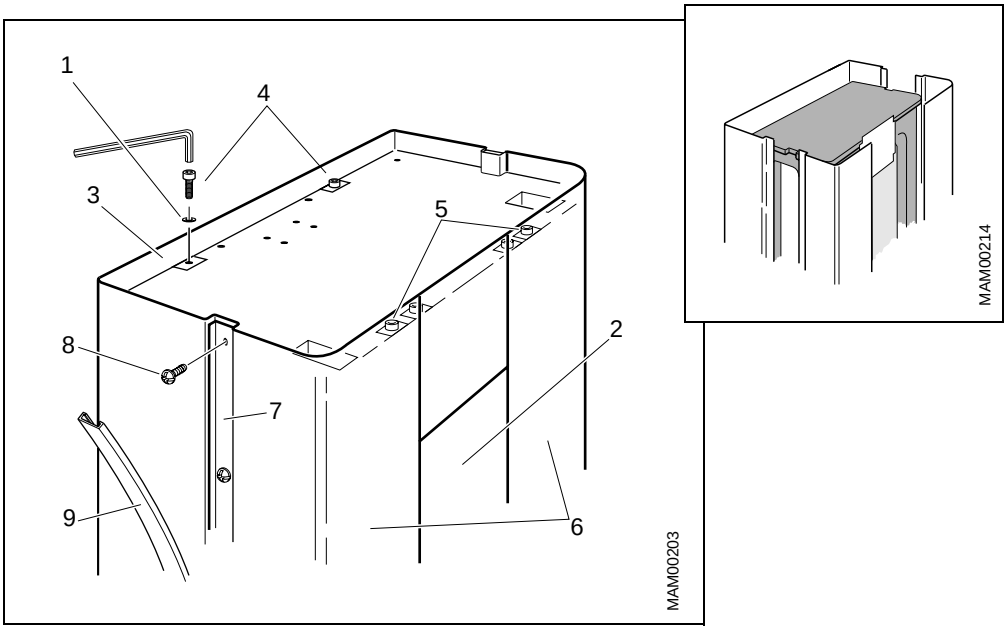

Fig. 2 Mounting the stand covers on a stand with single rear cover.

The covers are delivered with a protective plastic film, which shall be removed and discarded.

1. Fit left and right front covers (6) to the stand and fasten with screws and contact washers (5).
2. Fit the rear cover (3) to the stand and fasten it with screws (4) and contact washers (1).
   Be careful not to damage the cables at the cable outlet!
3. Fit inner plastic strip (7) to the front and side covers and fasten with screws (8), eight on either side.
4. Press on the outer plastic strip (9).

Fitting the Mammomat cap

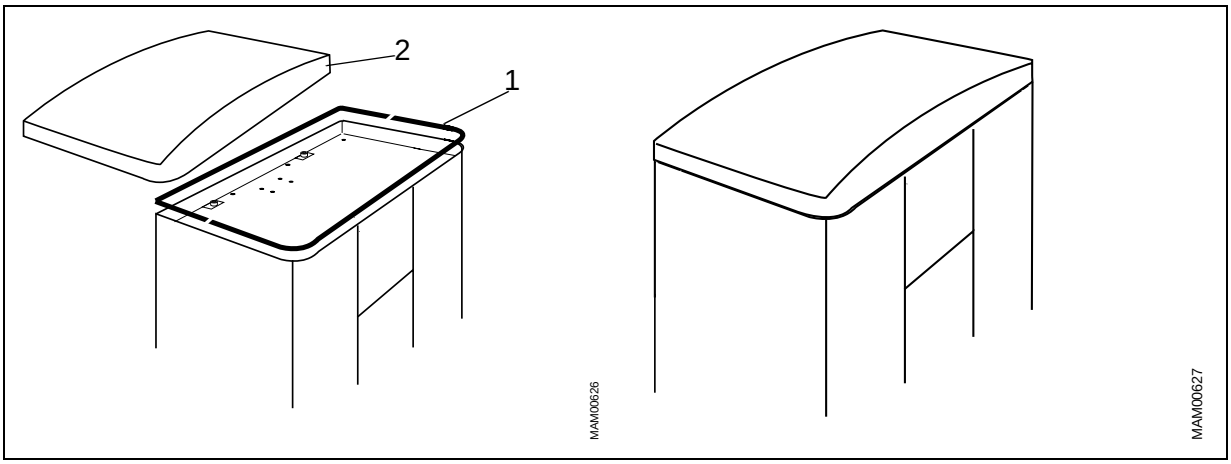

Fig. 3 Mammomat cap

1. Fit the rubber list on the edge of the stand (1).
2. Place the cap on the top of the Mammomat (2).

Fitting the cable outlet cover

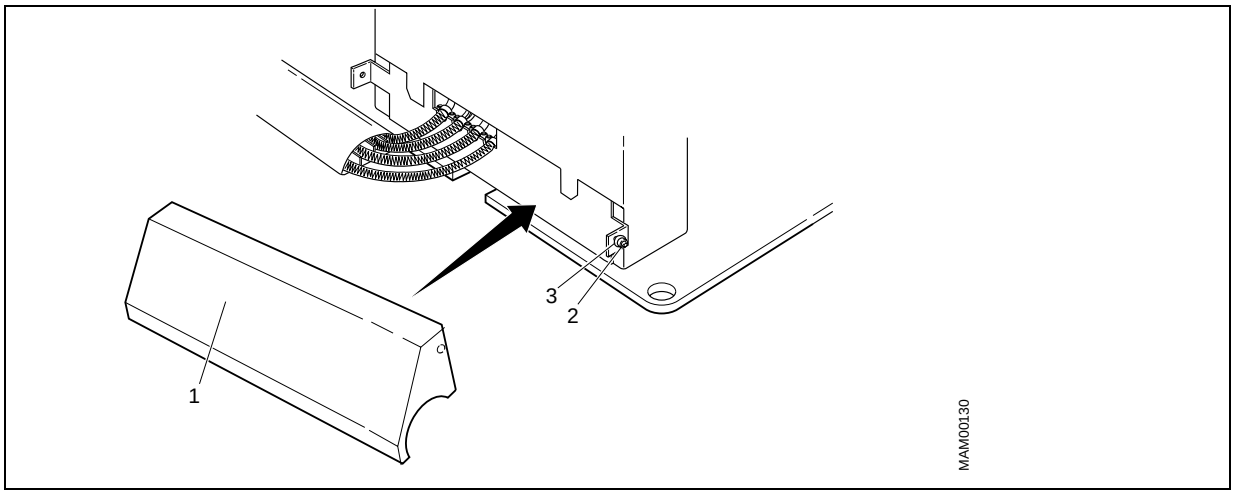

Fig. 4 Cable-outlet cover

1. Fit the cable outlet cover (1) to the stand and fasten with screws (2) and contact washers (3).

Mounting the front cover onto the generator

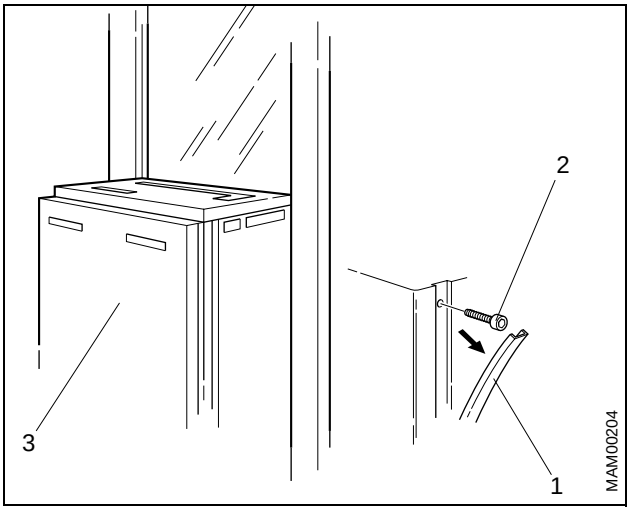

Fig. 5 Mounting the front cover

1. Fit the front cover (3) to the generator and fasten it with sixteen screws (2).
2. Press on the outer cover strip (1).

⚠WARNING

When attaching the front cover, make sure that all eight contact washers (four on either side) are used again as in the original assembly (under the screws with clearance holes in the plastic strips). The screws must be securely tightened and the washers must be functional. This is necessary to establish protective ground connection.

Final protective grounding resistance test

Using the protective ground wire tester, measure the resistance between the mains grounding connection (incl mains cable) and any metallic part of the stand and generator which the patient/operator may come in contact with.

The protective ground resistance must not exceed 0.2 Ω.

Face shield

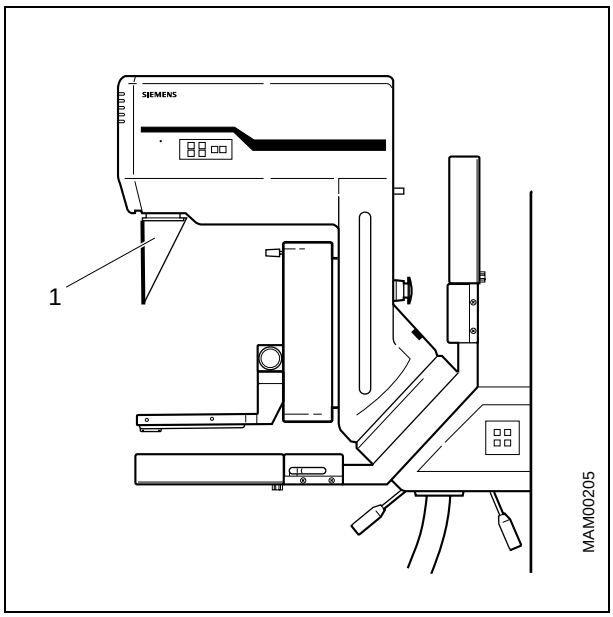

Fig. 6 Face shield

1. Slide the face shield (1) onto the holder for external diaphragms.

Warning label on control panel

The control-panel warning label comes in eleven languages; English, German, French, Spanish, Italian, Dutch, Danish, Norwegian, Finnish, Greek, and Swedish. The warning labels are found in a plastic bag under thumb index 3 in the Technical Manual.

NOTICE	**Warning label in english is provided on delivery.**

Choose appropriate language and affix the label over the existing label on the control panel, see Fig. 7. Be sure to position the label properly before affixing it. The label sticks immediately.

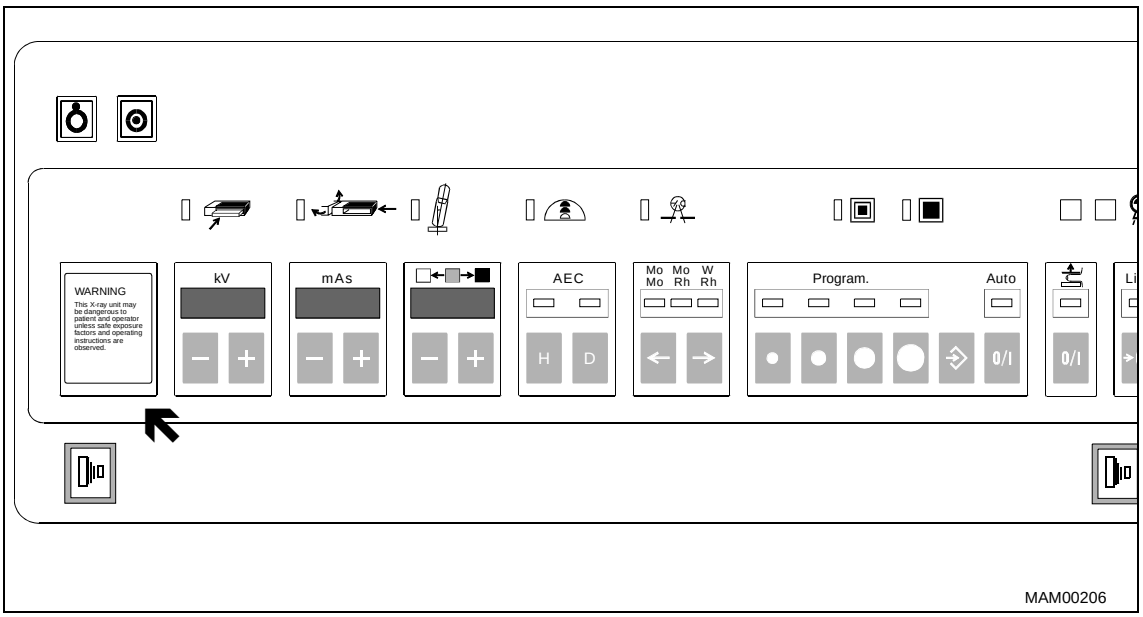

Fig. 7 Warning label on control panel

Affixing the identification labels

The identification labels for the stand are enclosed in a plastic bag together with the LINA card. The plastic bag is filed under index tab 3 in the technical manual.

1. Remove the protective film from the back of the identification-label plate.
2. Affix the plate on the right side cover down at the foot of the stand as shown in Fig. 8. Be sure to position the plate correctly before pressing it onto the side cover. The adhesive sticks immediately.

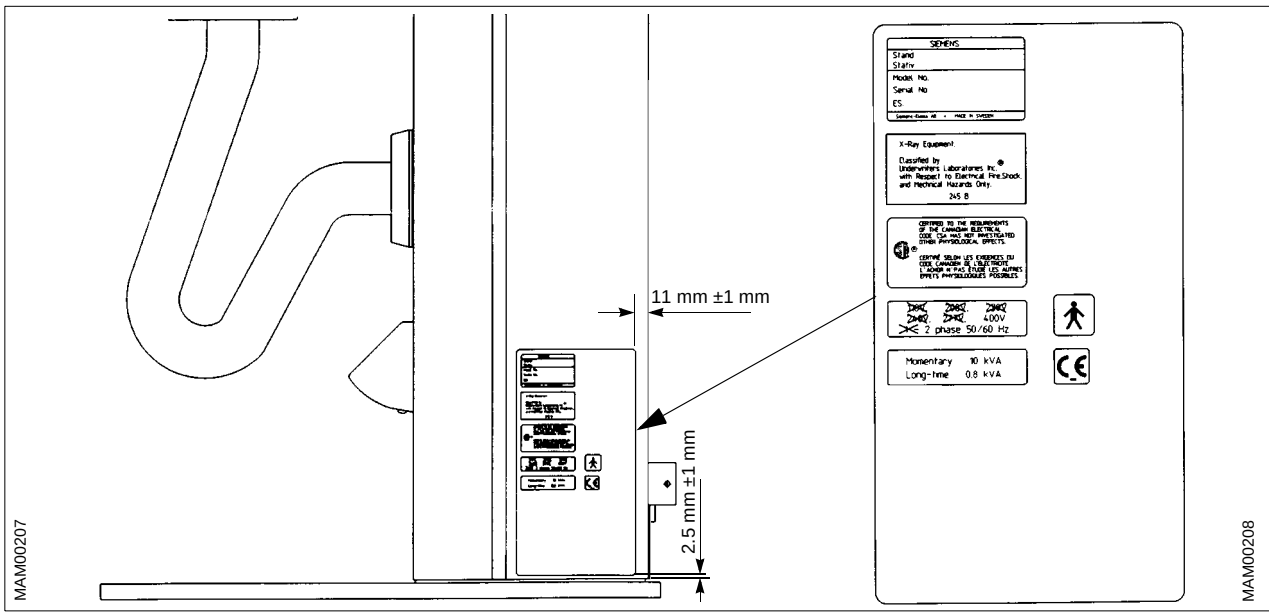

Fig. 8 Affixing the identification labels

Returning the LINA card

Fill in the LINA card and return it to the address stated in the instructions on the card.

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Stativ and generator with integrated radiation shield and control panel

Should a permanent fastening to the floor be required due to local regulations (for example in earthquake areas) or due to the quality of the floor covering, the stand/generator can be secured to the floor by means safety dowels and screws. When bolting the stand to the floor, the fixing screws shall pass through the hollow levelling screws (1). When bolting the generator with integrated radiation shield and control panel to the floor, the predrilled fixing holes (2) shall be used.

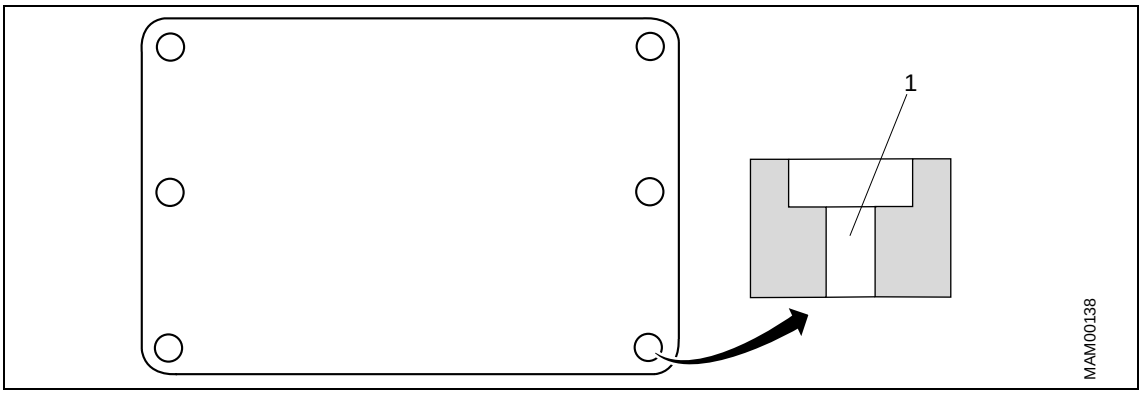

Fig. 1 Base plate for the stand

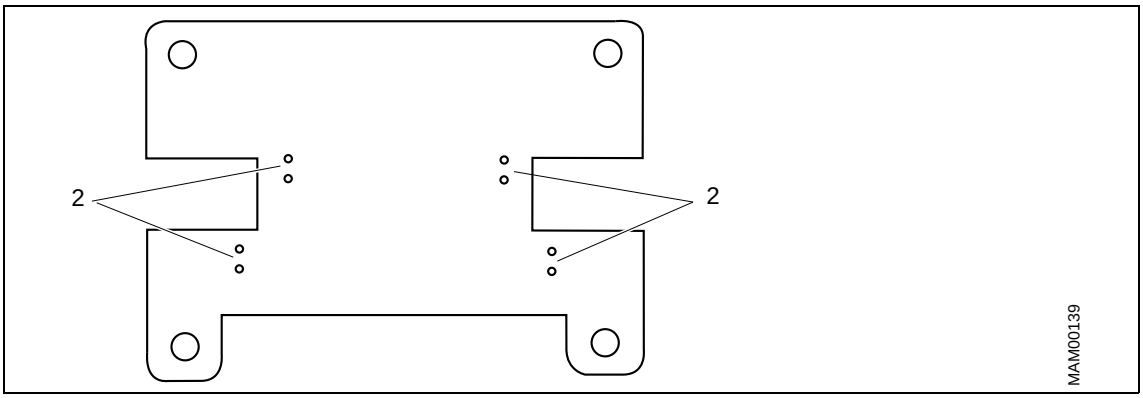

Fig. 2 Base plate for the generator

1. Position the stand /generator and mark out appropriate fixing holes on the floor, using the base plate as a template.

NOTICE **The base plates shall be secured with at least four screws each (two on either side).**

2. Drill the holes and insert dowels and screws (use Liebig safety dowel M6 S10/35 and washer DIN 9021B, ISO 7093 or equivalent. Tighten the screws to 10 Nm.

CAUTION **Make sure that the screws do not come in contact with any conductive material such as reinforcing iron.**

Installation with separate generator

The separate generator **must** be bolted to the floor and/or be secured to the wall by means of the enclosed wall brackets. For bolting the separate generator to the floor, the same procedure as for generator with integrated control panel and radiation shield applies, see page 19 - 1.

For attaching the wall brackets to the generator , the uppermost screw hole for the lead-glass stanchions shall be used. Ensure that the wall brackets are secured to the wall with adequate safety margins. Dowels and screws are not supplied. Please obtain these locally and ensure that they are suitable for the material used in the wall.

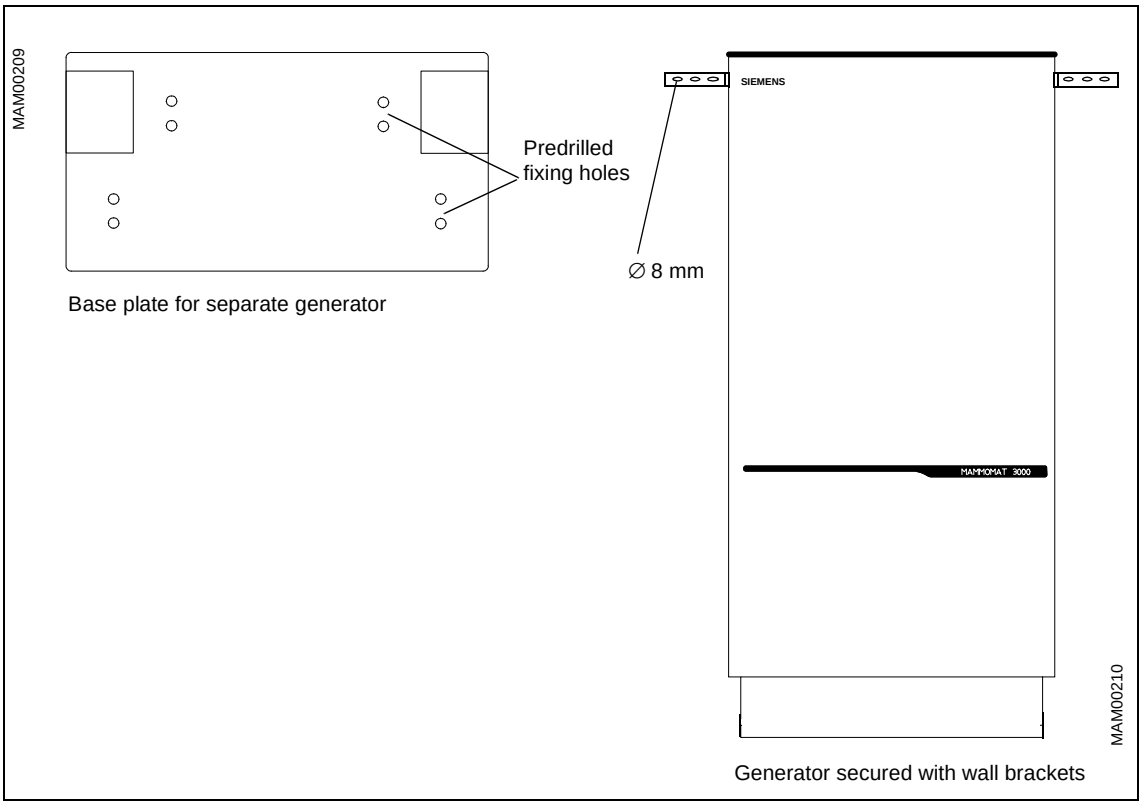

Fig. 3 Base plate and wall brackets for separate generator

Free-standing radiation shield (option)

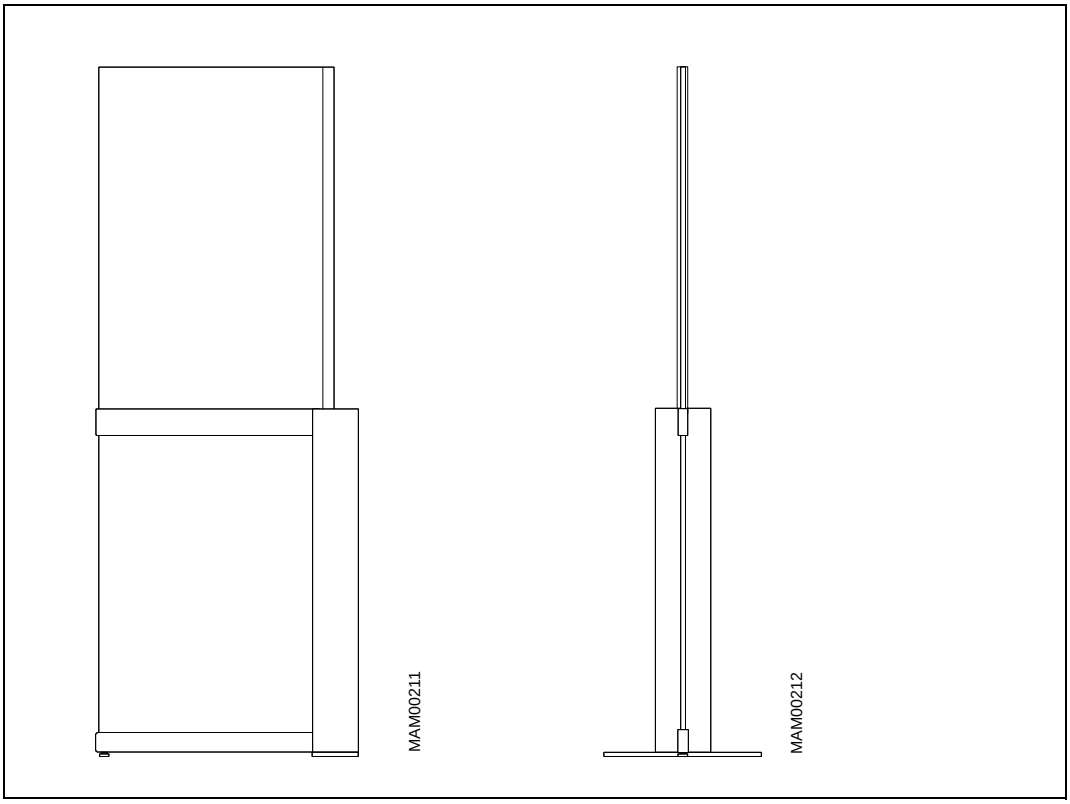

Fig. 4 Free-standing radiation shield

The free-standing radiation shield must be bolted to the floor, see separate instructions enclosed with the radiation shield.

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Working with the service PC

Description of the syntax used in these instructions

< ..... >	The indication of which function keys to press is given between these characters, for example <ENTER>, <ESC> etc.
CAPITALS	Capital letters indicate data which must be entered unchanged, for example the name of a register, files etc.
Italics	Italics represent data in which a value should be entered, e.g. for user name, the name of the technician should be entered.
[.....]	Square brackets enclose additions to commands which may be optionally entered.
Bold	Data relating to formats, user entries etc., which is important for the following entry, is shown in bold as it appears on the monitor screen.
_____	This character indicates that at this point the space key must be pressed.
xx yy zz	Data can be entered in place of *"x, y, z"* (e.g. day´s date).
{...}	Curved brackets indicate that out of several terms listed one below the other, one must be selected.
NOTICE	Important remarks are indicated with this box.
* * * * *	When the password is entered, only these characters are shown.
Menu Selection:	When several menus, programs, files etc. are presented for selection, they are shown in a box (program window). Selection is made with the <↓> and <↑> keys. The module selected is highligthed in the display.
<ENTER>	Every entry must be confirmed with the <ENTER> key.
<ESC>	ESC allows paging back through the program.
<xx> + <y>	Some functions are selected by pressing two keys simultaneously. Procedure: Press, for example, the <Shift> key and keep it depressed, press the <*> key and then release both keys.
<F1>	Key <F1> calls up a selective help text.
<F10>	Key <F10> exits the program.

XXX - - XXX - -
XXX - - XXX

By this means, the way is shown how to call up a particular sub-routine (display windows).

For example:

Main menu —
Configuration —
Iontomat —
Corr. curve —

Connecting the service PC

The service PC must be connected with connecting cable part no. 99 00 440 RE999 to p.c. board in the generator (do not insert the diskette in the drive yet). **Use port COM 1 on the service PC.**

Starting up and using the service PC

1 Switch on generator and service PC.
After initialization, the service PC shows: **C:\>**

2 Now insert the discette with the service program.

3 Select the appropriate drive {A:} {B:} and then press <ENTER>.
The screen shows: **A:\>** or **B:\>**

4 Start the service program by typing 'SERVICE', then press <ENTER>.
The program asks for the user's name: ***Your name, please***
Type the name of the technician, for example NN, and then press <ENTER>.

5 The program asks for the password: ***Password, please***
Type the password (********) and then press <ENTER>.
The display window shows: ***Main menu***

6 Select the program part to be used with keys <↑> and/or <↓>, then press <ENTER>.
The program part selected is shown with a background: ***Configuration***
If necessary, additional subroutines can be similarly selected here.

7 Make the necessary entries in the appropriate part of the program.
Save the entered data with <F2>. Page back in the program with <ESC>.
The appropriate instructions are shown on the monitor.

8 End the procedure with the service PC with <F10>.

Measuring protocol

Values recorded during installation of Mammomat:

Tube P40 MoW, tungsten anode 0.3 (MAMMOMAT 3000 only)

Calculated values	Required values
_____V x 5 kV/V = _____kV	30 kV ±5 %
_____V x ____ s x 40 mA/V = ____ mAs	20 mAs ±10 %

Date:_____
Sign:_____

Tube P40 MoW, molybdenum anode 0.3

Calculated values	Required values
_____V x 5 kV/V = _____kV	30 kV ±5 %
_____V x ____ s x 40 mA/V = ____ mAs	20 mAs ±10 %

Date:_____
Sign:_____

Tube P40 MoW, tungsten anode 0.15 (MAMMOMAT 3000 only)

Calculated values	Required values
_____V x 5 kV/V = _____kV	30 kV ±5 %
_____V x ____ s x 40 mA/V = ____ mAs	10 mAs ±10 %

Date:_____
Sign:_____

Keep measuring protocol in technical documentation.

Tube P40 MoW, molybdenum anode 0.15

Calculated values	Required values
_____V x 5 kV/V = _____kV	30 kV ±5 %
_____V x ____ s x 40 mA/V = ____ mAs	10 mAs ±10 %

Date:_____
Sign:_____

Tube P40 MoW, tungsten anode 0.3 (MAMMOMAT 3000 only)

40 mm plexiglass

Calculated values	Required values
_____V x 5 kV/V = _____kV	30 kV ±5 %
_____V x 40 mA/V = ____ mA	158 mA ±10 %

Date:_____
Sign:_____

Tube P40 MoW, molybdenum anode 0.3

40 mm plexiglass

Calculated values	Required values
_____V x 5 kV/V = _____kV	30 kV ±5 %
_____V x 40 mA/V = ____ mA	125 mA ±10 %

Date:_____
Sign:_____

Keep measuring protocol in technical documentation.

Tube P40 MoW, tungsten anode 0.3 (MAMMOMAT 3000 only)

40 mm plexiglass

Calculated values	Required values
_____V x 5 kV/V = _____kV	30 kV ±5 %
_____V x 40 mA/V = ____ mA	158 mA ±10 %

Date:_____
Sign:_____

Tube P40 MoW, molybdenum anode 0.3

40 mm plexiglass

Calculated values	Required values
_____V x 5 kV/V = _____kV	30 kV ±5 %
_____V x 40 mA/V = ____ mA	125 mAs ±10 %

Date:_____
Sign:_____

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